# Scientific American.

A JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, AGRICULTURE, CHEMISTRY, AND MANUFACTURES.

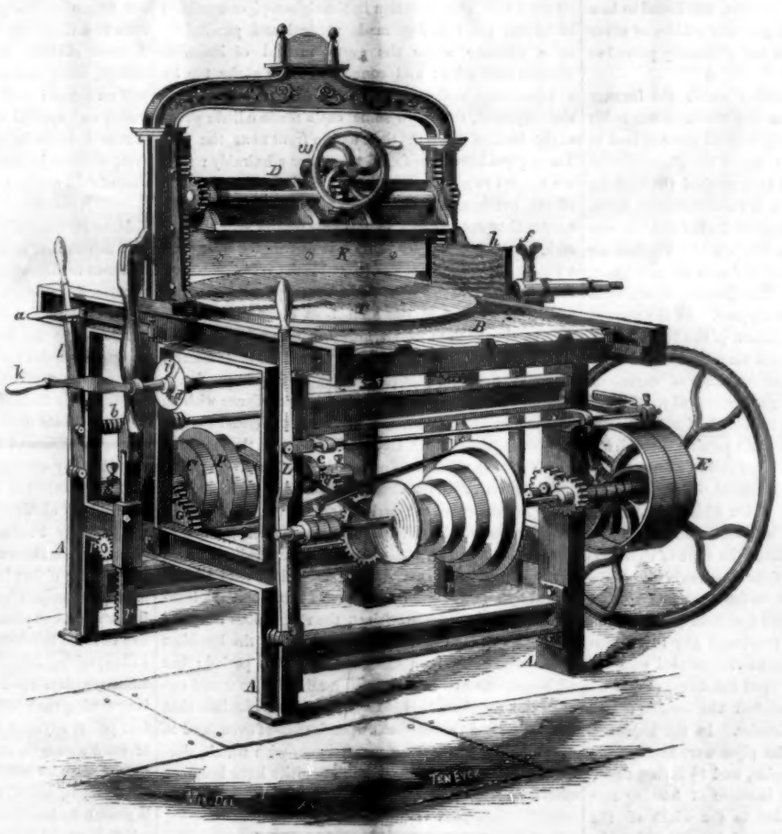
VOL. 1.—NO. 15. NEW YORK, OCTOBER 8, 1859. NEW SERIES.


## BURROUGHS' PAPER-CUTTING MACHINE.

There is great satisfaction in occasionally examining a machine which shows a knowledge of mechanical principles on the part of the inventor, and a common-sense adaptation of them to the several effects which he desires to produce. Such satisfaction we have had in going through with the several parts of Burroughs' Paper-cutter. We do not doubt that, not only job-printers and bookbinders, but machinists also will be interested in following us through the description which, with the aid of the accompanying cut, we hope to make clear.

A A A is an iron rectangular frame, on which the whole is constructed. T is the turning-table, on which the paper is placed, and K the knife which is drawn down through the paper, with a combined vibratory and descending motion. The vibratory motion is given to the knife by means of a device not fully shown in the perspective cut, as it is on the further end of the machine. A vibrating arm works in a slot in the knife-frame, which slot is of sufficient length to permit the vertical motion of the knife. The vertical motion is produced by two pinions, *p*, working in the racks, *r r*, at the ends of the machine. The two pinions, one of which is shown at *p* are fastened upon the shaft, S, through which runs the smaller shaft on which the pulleys, P (of various sizes for adjusting the velocity) are fastened. This series of pulleys may be regarded as one pulley, and it has a friction clutch at each end; the large clutch, C, being fastened to the hollow shaft, S, which is geared to the small shaft, *s*, in a way to draw the knife down, while the small clutch, *c*, is geared to the shaft, *s*, in a way to carry the knife up. The small shaft on which the pulley, P, runs is slipped to and fro, through the large shaft S, by means of the lever, *l*, a fork, not shown in the cut, being fastened firmly to the rod about which the spiral spring is wound, and coming down by the side of the series of pulleys. When the lever, *l*, is drawn out from the frame, the large clutch, C, is tightened and brought into action, by which means the gearing, G, is turned and the knife brought down. When the lever, *l*, is drawn back against the frame by the spiral spring, *b*, the small clutch, *c*, is tightened and brought into action, by which the gearing, *g*, is turned and the knife carried up. When the lever, *l*, is drawn out from the frame, it is held by the latch on the small horizontal lever, *a*. The lever, *a*, works on a fulcrum, which is hidden in the engraving by the vibrating rod which connects the knife, *k*, with the rack, *r*, and is provided at its short end with a pin which rises in the knife-frame to a hight just sufficient to cause this pin to be pressed by the descending knife, when the edge of the blade reaches the turning-table. This pressure raises the latch of the lever, *a*, and allows the lever, *l*, to be drawn back by the spring, *b*, which slips the interior shaft on which the pulley, P, runs, throws the large clutch, C, out of action, and the small clutch, *c*, into action, and thus changes the descending motion of the knife into an ascending motion.

The object of this self-operating action is to save the table from being cut. The turning table, T, on which the paper is laid, revolves upon a pivot in its center, and rests upon the bed, B, which is moved back and forth horizontally in the frame, by means of the pinion, *j*, working in the rack on the underside of the bed. The pinion, *j*, is turned by the crank, *k*, and the distance to which the bed is thus moved may be measured with precision by the index, *i*, turning before the dial-plate, *d*. The paper is held in place on the table by the clamp, D, which is moved up and down by means of the endless screw or worm, *w*, which turns the pinions that gear into horizontal racks, as shown in the cut. To facilitate the placing of the paper or book in proper position on the table, the board, *h*, is arranged at right angles with the knife, and by a telescopic arrangement may be moved back and forth, being held in position by set screws, one of which is shown at *f*. To trim a book, place the back of the book against the board, which should be drawn out a sufficient distance to allow the book to lie on one side of the table. After the book is placed, roll along the bed B, by means of the handle, *k*, until the edge of the book is under the knife; bring down the clamp, D, firmly upon the book, start the machine and cut the edge. Then raise the clamp, and roll the table, T, one quarter around (which is measured by notches cut in its edge), bring the edge of the book under the knife, and proceed as before. The power is applied by means of a belt brought upon the pulleys, E, and the belt is slipped from either the tight or loose pulley to start or stop the machine by means of the lever, T. We have seen one of these machines in operation; they seem to work with all the ease and accuracy which might be anticipated from the admirable arrangement of the several parts.



BURROUGHS' IMPROVED PAPER-CUTTER.

The patent was granted Aug. 9, 1859, to E. Burroughs, of Rochester, N. Y., to whom orders for the machine may be addressed. Any further information may be had at the Inventors' Exchange, No. 37 Park-row, this city, where a model is on exhibition.

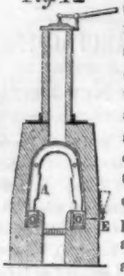
HAIR-BRUSHES AND COMBS.—Children should be taught, from their earliest remembrance, the importance of keeping the hair clean, not so much by the use of the comb as the brush. Two sorts of combs are used, fine and coarse, made either of ivory or bone; when the brush has been well used, there is seldom any necessity for the fine-tooth comb; and the intention of using the coarse comb is merely to disentangle the hair and prepare it for the brush. Nothing is more injurious to the skin of the head than the frequent application of the small-tooth comb, the points of the teeth of which scratch and otherwise irritate the scalp, tending more than any other cause whatever to the formation of scurf. It cannot be too strictly impressed upon the minds of parents, if they would see their offsprings blessed with a good head of hair, to refrain as much as possible from the use of the small-tooth comb; a moderately hard brush is quite sufficient to keep the head and hair clean, and should be used the first thing in the morning, on account of the hair being more supple at that time than any other. When children suffer from a scurfy head, the following wash used occasionally will remedy the evil at once, and will eventually cure the complaint. Take of salts of tartar, four drachms; tincture of cantharides, 20 drops; spirits of camphor, 20 drops; lemon juice, half a pint. Dissolve the salts of tartar gradually in the lemon juice, till the effervescence ceases; then add the other ingredients, and after leaving it exposed to the air for a short time, it may be perfumed and bottled for use. This is the finest and most innocent hair-wash that can be made.

## HOT-AIR OVENS FOR IRON FURNACES.

[Continued from page 230.]

The writer has not been able to ascertain to whom is due the merit of first introducing a practical remedy for fracture in siphon-pipe ovens; but he is able to show, through the kindness of Messrs. Lloyds, Fosters & Co., a drawing of one of the first ovens erected at their works about 1840, in which this difficulty was overcome. The oven is shown in Fig. 12, and as it presents many features of marked improvement over any of those previously described, it may be referred to more in detail. In all the previously-described tubular ovens, the two legs of the pipes and the longitudinal mains were made as fast and immovable as could be effected by cast iron and solid masonry. In the present example, however, one main only was made fast, and even that was placed on cast-iron saddles, to allow of a slight rotatory motion on its own axis; whilst under the saddles supporting the opposite main A, cast-iron rollers were inserted, which permitted the main to move freely under the influence of the expansion of the siphon-pipes. This plan, by permitting the legs of the siphon-pipes to assume their natural position under expansion, was found to be a great improvement, and fractures now seldom or never occurred from the strains which had previously proved so pernicious in the former ovens.

*Fig. 12*




Up to this period the only means which the furnace manager had of ascertaining whether the heat was being properly kept up was by applying a small piece of lead to the stream of blast issuing from one of the plug-holes attached to each tuyere; if the blast melted the lead the heat was considered up; if not, it was considered down. This test, however, involving a good deal of trouble, was frequently neglected; and, in consequence, the first intimation of the heat being down was seen when too late, by its effect on the working of the furnace, shown by a change of cinder or the furnace slipping. In the present case, however, advantage was taken of the lateral oscillations of the loose main, which amounted at times to more than two inches, under the influence of variations of temperature, to construct a good practical pyrometer. This is shown at one side, and consisted of a simple bar fastened at one end to the loose main passing through the brick wall, and attached at the other end to a lever working a small index, E. This answered the purpose very well; for the position of the index when the heat was sufficient to melt lead having been once ascertained, its position afterwards told at a glance the state of the oven. In some cases the movements of the loose main were communicated by a series of levers to the dampers; so that on the temperature rising beyond a certain point the expansion shut the dampers and prevented any further increase of heat, until the main had so far receded with the reduction of temperature as to open the dampers again.

In the ovens previously described the section of the siphon-pipes was invariably circular. In the improved Staffordshire oven, however, the pipes were made of an oval section, 5 inches by 10 inside, and 1½ inches thick, whereby a very considerable increase of heating surface was obtained in proportion to the width of the pipes, without enlarging the casing of the oven or lengthening the mains. The increased hight to which the crown part was raised above the grate in Fig. 12, amounting to 11 feet 6 inches, enabled the pipes now to resist the fire, which in the first trial with the low semicircular arch had destroyed them, and had thus probably led to the long discontinuance of the oval section. As a further precaution against the pipes being burned, the legs of the siphon-pipes were strengthened and protected at the point where the fire first caught them, by a thicker strip of metal cast at that part, as shown at A.

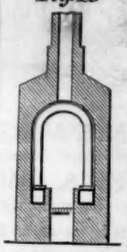
The general dimensions of the improved Staffordshire oven shown are as follows:—

| | |
|---|---|
| Length inside casing..... | 16 feet. |
| Breadth do. ..... | 7 feet 6 in. |
| Number of siphon-pipes..... | 16 |
| Area of heating surface, total..... | 700 sq. feet. |
| Do. per tuyere (four tuyeres).. | 175 sq. feet. |
| Area of fire-grate, total..... | 35 sq. feet. |
| Do. per tuyere..... | 9 sq. feet. |

An oven of these dimensions is sufficient to heat the blast for four tuyeres to a temperature of 600° or 700° Fah.

Notwithstanding, however, the great improvements above described, which much diminished the number of fractures, these still took place; and singularly enough, not now on the top side of the crown as before, but on the underside. This was accounted for by the fact that the strain in pushing out the loose main was comparatively easy to be borne, being distributed over the long bend of the top side of the crown; but the underside of the bend was of the weakest form for pulling back the heavy loose main on a reduction of temperature, especially when the rollers had become clogged with an accumulation of indurated dust and clinker, as was frequently the case. A further reason also of this defect, and perhaps the more important one, was the circumstance that the iron at the underside of the bend, now subjected to tension, was exposed to the direct action of the heat, and therefore sooner lost its nature than the upper side of the pipe.

*Fig. 13*



These considerations lead to a further alteration in the form of the siphon-pipe, as shown in Fig. 13, and at the same time the loose main was abandoned, notwithstanding its advantages as a pyrometer, and fixed mains were reverted to. The alteration in the siphon-pipes consisted in having the two legs made vertical and parallel for some distance above the grate, instead of inclining towards each other; and connecting them at the top by a large semicircular arch. A flat oval section of pipe was employed, though in some cases made a little wider at the back of the pipe than at the front next the fire. These pipes have been found to answer admirably; they are not apt to get burnt near the socket, as in the case of the overhanging siphon-pipes previously described; nor are they apt to crack in any part of the semicircular arch, as the strain on expansion is distributed over such a length of circumference as to enable the vessel to stand. A modification of this form of hot-blast pipe was once tried having the crown of the arch bent downwards in the middle, in the form of an inflected curve instead of a plain semicircular arch; but this proved an utter failure, the underhanging center-piece being quickly burnt down. It is mentioned here as a warning, in accordance with an observation which once fell from the first president of the institution, the late Mr. George Stephenson, that nothing was of greater value than a record of failures.

Of the various ovens described, on the rectangular tubular construction, the writer is inclined, after careful consideration of all circumstances, to give the preference to that shown in Fig. 13, in which the longitudinal mains are fixed, and the siphons have their legs parallel and united by a large semicircular arch at the top. In leaving this portion of the subject, the writer does not wish it to be supposed that he has noticed all the hot-blast ovens which have been designed up to this period; but he has endeavored to make such a selection as would enable the members to follow the various difficulties that have presented themselves with each class of oven, and to appreciate the painstaking perseverance with which, during the last thirty years, those difficulties have been encountered step by step, and gradually overcome.

[To be continued.]

## HOW TO REMOVE THE HUMAN HAIR.

The hirsute appendage has become so popular among men that there is no longer the inquiry, "How shall I get rid of superfluous hair?" In fact, the great study seems to be with them how to perpetuate its growth, and many a gallant young man, as well as gay old gentlemen (who are not Absaloms in this particular), would pay liberally for a head-wash capable of increasing the quantity and quality of the hair. Not so, however, with the fair sex; they consider the growth of hair on the upper lip, upon the arms and on the back of the neck, detrimental to beauty. Sometimes nature is a little too lavish in this respect; and many an otherwise fair one, fearing to be classed with the sterner sex, is anxious to avail herself of the most recent discoveries in science for the eradication of a useless and somewhat unseemly growth of fine hair. Our friend, Septimus Piesse, anxious at all times to aid the ladies towards perfection in their personal attractions, says those who are troubled with such physical indications of good health and vital stamina, have long had recourse to *rusma* or depilatory for removing it. This and analogous preparations for the toilet of beauty were introduced to us from the East, *rusma* having been in use in the Persian and Turkish harems for many ages. Burnett, the botanist, says that the juice of the leaves of the *hernandia sonora* is found to be an advantageous and effectual depilatory, as it destroys the hair wherever it is employed, without pain to the skin. Knowing well how much many of our readers would value such an article we regret our inability to test the merits of this assertion, in consequence of the *hernandia* growing only in the marshy swamps of tropical America. We can therefore only suggest the mode of destroying hair by adopting the plan in use by the fellmongers for removing the hair from peltry—that is, by lime. Caustic, or quick-lime, will certainly destroy hair; but when the hair is growing upon the human skin, it requires both patience and careful application, in consequence of its action upon the skin. Take a piece of the best lime about two ounces weight, put it into a saucer, and pour on it boiling water till it slakes, spread the paste thickly over the hair to be removed, and let it remain till no longer bearable. Then take an ivory or bone paper-knife, and imitate the process of shaving; finally wash the part, and apply a little rose cold cream to allay any irritation of the skin. If this be not effectual by one operation, the process must be repeated next day, even to a third operation if the hair be strong or black. A more effectual depilatory consists of lime slaked to powder, three ounces; orpiment (sulphuret of arsenic), half an ounce; well mixed and made into a paste with water, and applied as the above. This preparation must, of course, never be used but with extreme caution. However, if there be any irritation of the skin, the application of cold cream will remove it in a few hours.

MISS MITCHELL'S TELESCOPE AND OBSERVATORY.—The mechanism of this telescope is probably not excelled by those manufactured in Europe. Its focal strength is between five and six feet, and the clear aperture of the object-class is five inches. It is mounted equatorially, according to the German method, and furnished with graduated circles for the determination of the positions of the heavenly objects. The circle for measuring right ascensions is divided to single minutes, but by means of a vernier reads to five seconds of time. The declination circle, by means of the vernier, reads to ten seconds of arc; but, by accompanying microscopes, single seconds may be determined with tolerable accuracy. It is furnished with clockwork on the plan of Fraunhofer, and so regulated by Professor Bond's spring-governor as constantly to counteract the effect of the earth's rotation, keeping the object in that part of the field of view which may best comport with the convenience of the observer. It has eight eye-pieces, with powers ranging from seventy-five to three hundred and fifty. It is furnished also with a filar-position micrometer of excellent workmanship. The telescope plays upon a stand, composed of slabs of iron intersecting each other at right angles, and resting on four points adjusted by foot-screws. This rests on a pier of solid masonry, surmounting a mass of granite. The base of the pier is laid so low that the severest frost cannot affect it, and the whole is isolated from the surrounding earth by beach sand, securing it from the tremor to which it would otherwise be exposed from passing carriages on a road, unpaved at a distance of fifty yards. The great Russian astronomical observer, Struve, has said that an observatory should be a covering for a telescope. Either from this precept, or from necessary economy, Miss Mitchell has constructed her observatory in such a manner as merely to shelter the instrument. On entering it, however, it is found to possess all the needful equipments of a more costly establishment. It is a circular building, eleven feet in diameter and scarcely more in height, covered with an ordinary roof made to revolve on cannon balls. By this means, a narrow aperture in the roof is easily brought to the point of the heavens under inspection. As the chief object of Miss Mitchell is to devote the instrument to scientific work, the whole period since its construction has been employed in making those nice adjustments so necessary to useful results.—*Providence* (R. I.) *Journal.*

M. BERCHOLD, of Paris, has succeeded in engraving on zinc plates by the action of light alone, and his plates can be printed from as easily as wood-cuts.

## THE ARTIFICIAL MAN.

[From "Once a Week."]

WHILE lounging the other day in a medical library, I chanced to take up a little volume, the odd tittle of which led me to dip into it—"Bigg on Artificial Limbs." I had heard of the skillful, anatomical mechanician of Leicester Square, whom the Queen delighted to honor with commissions for cunningly devised limbs for wounded soldiers during the Crimean war; but I never realized to myself the art with which man can eke out the defects of nature until I glanced over this little volume; the contents of which so struck me, that I was determined to see for myself how far that cunning biped man can simulate the handiwork of our great mother. I was received courteously, and on explaining the nature of my errand, an assistant was sent through the different workshops to satisfy my curiosity.

A very few minutes' conversation with my conductor left the impression upon my mind that, instead of having any profound respect for Nature, he looked upon her as sometimes rather in the way than otherwise; for, happening to ask him playfully, as a kind of starting question, with how small a modicum of humanity he could manage to work, "Sir," said he, very seriously, "we only want the vital principle; give us nervous centres and sound viscera and we find all the rest."

"But," said I, not prepared for this liberal offer, "suppose a man had only three inches of stump?"

"Three inches of stump!" he replied, contemptuously, "with that allowance we could anything. There is," said he, "somewhere in Ireland, a gentleman born without limbs, who goes out hunting in a clothes-basket strapped on his horse's back. If we could only get hold of him, his friends, in six weeks, would not know him."

An inspection of my friend's *ateliers*, certainly, went far to justify the confident spirit in which his assistant spoke. I soon found out that there are first, second, and third-class limbs, however, as of everything else.

"What!" said I, "do you make banisters as well as legs," pointing to a shelf-full neatly turned and painted.

"Banisters! my dear sir," he replied a little hurt, "these are our Chelsea pensioners!"

And on a closer examination such they proved to be. Here was a hard third-class fact, simple and unadorned.

"And these buckets?" I rejoined, pointing to some scores of hollow wooden cones placed one within the other.

"Bucket's the word!" said he, reaching one down, and screwing a banister into its lower end. "These are our Chelsea pensioners complete. But this is nothing to what they have in store at the Chelsea Hospital. During the war we could not make them fast enough, and they were obliged to apply to the mop-makers. Fact," said he, seeing the surprise in our eyes—"and arms, too! You should see the rows and rows stored on the shelves; their hooks hanging out like so many umbrellas. Government can only afford hooks for soldiers and sailors; but officers who are not able to pay, can get new legs and arms of the very best construction at the expense of a grateful nation, by simply applying at the Horse Guards."

All the while this serio-comic conversation was going on, a workman in the coolest possible manner was working away at a most delicate little leg that would have come off second best in the "Judgment of Paris"—a faultless Balmoral boot, and the daintiest silk stocking covered proportions that Madame Vestris might have envied.

These," said my companion, "are some of our first-class goods. Would you like to see the mechanism?—Goodge, pull down the stocking." With that the workman bared the limb, whilst my companion put it through its paces. "This, you see, is our patent knee-cap and patella, and this the new vulcanized india-rubber tendon-achillies; here in the instep, you will observe a spiral spring elevating the toes, and if you will just observe (opening a little trap-poor in the back of the calf), here is an ingenious contrivance by which the bending of the knee, elevates the front part of the foot, thus allowing it full play to swing forward clear of the ground."

Certainly it was an admirable contrivance.

"And can a man or woman progress easily with that arrangement?" said I.

"Do you know Lady ——?" said he.

"Yes."

"Nothing the matter there?" he rejoined, interogatively.

I was obliged to confess, not to my knowledge.

"That's her spare leg nevertheless," he replied triumphantly.

"Spare leg! What do you mean?"

"Lord bless you! Look into that cupboard. I have the spare members of half the town there duly labeled. Things will go wrong with the best conducted limbs; and to save difficulties we keep duplicates which can be applied at the shortest notice. A gentleman, whom we will call Mr. Smith, once lost the pin out of his knee-joint, and sent here for his off-leg. A young lad up from the country sent him another Mr. Smith's box containing an arm—very awkward."

"Will you allow me?" said I, trying to read the names on the boxes.

"Certainly not," said he, shutting the door and turning the key: "this is our Bluebeard's cupboard, and I wouldn't allow even my wife to peep. But come and look at our hands."

There they were—some clenched, some spread out, some in the act of holding, some gloved, and displayed like Vandykes, as if to challenge attention.

"Now, what will they do?" said I, almost doubtful whether the clenched fist wouldn't strike.

"Do anything," said he: "by means of the hook inserted in the palm, it can lift or hold the reins, almost as well as the natural member. Observe the beautiful operation of the spring thumb imitating the grand privilege of man and monkey, by means of which it can grasp a fork or lightly finger a toothpick."

"Do you supply fingers and such small geer?" I inquired.

"Fingers, toes, noses, lips—we take them as they come. A gentleman with but one finger on his left hand came to us the other day, and asked to have the compliment made up. We fitted on the rest and attached them by means of a signet ring to the remaining finger—movement perfect; you should see him pass his fingers through his hair—natural as life. The hand is a wonderful thing—that beats me—legs are mere A B C, but the hand!—Here," said he, recovering from his momentary admiration of nature, "here is a drawing of a pretty thing. A Hudson's Bay trapper had his hand bitten off by a bear, and come to us to replace it. 'Do you want something really useful?' said I. 'Yes,' said he. So I made him this dagger, fitting into his arm-stump socket. He sleeps in his dagger and finds it particularly handy when there are any bears about. Look at the action of this spring and rachet-elbow: you have only to touch the little button in the elbow, and the fore-arm closes as natural as life. Who would wear an empty sleeve when a member like this can be obtained? We always recommend our arm and hand patients to wear a cloak neatly folded over it, as it prevents any attempt at hand-shaking. We don't warrant the shake—the touch isn't quite natural."

"But how about the more delicate operations—eyes and noses?" I inquired.

"Oh, we do any feature at a moment's notice. Noses, for instance: the best way is to bring a patient to the modeler, who first designs the missing member in clay after a portrait or from instructions; from this an india-rubber cast is taken, to which we fit on a pair of spectacles, to break the flesh line; and when the superstructure is complete, an artist puts on the complexion."

"And eyes?" I added, deeply interested.

"Eyes we do not do so much in," he added apologetically. "There is M. Boisenou, from Paris, who travels with all the eyes of Europe—from the black of Andalusia to the blue of Scandinavia."

"But how are they applied?"

"Easily as possible," he added, pulling out a drawer and displaying the upturned gaze of winkless scores. "Let me see," said he, rapidly taking up eye after eye, and comparing them with my own. "Light grey—that's a good match. Now, with this little ivory jemmy we prize the eye into its socket; the muscle being left, we get good motion, and the deception is perfect. A lady once closed her good eye, and went up to the glass to see her false one. There is one little drawback, however: you can wipe away a cold tear perfectly, but as the eyeball itself is not sensitive, the flies sometime walk about upon it, which looks odd."

"You must see a vast deal of maimed humanity," said I.

"And vanity, too," he replied. "But I am afraid I must leave you, as I see there is a leg-below-knee, two toes, and an arm waiting to see me in the waiting-room, and there in the cab—we are near levee-day, I suppose—is the Honorable Augustus Witherdman calling for his calves."

As I walked homeward, my head full of the subject I had been dwelling upon, the "artificial man" seemed to meet me in detail everywhere. There were his teeth grinning at me in glass cases outside the dentists' shops—teeth in sets, with the new patent elastic india-rubber gums, warranted equal to the living tissue, without the disadvantage of growing gum-boils. How many fair dames smile at us, whose flashing ivories have lain for years on continental battle-grounds or, perhaps under the verdant churchyard sod at home! The hairdressers' windows, again, bloomed with deception. Here, indeed, art has made a stride. The old stereotyped form of wig, with its sprawling wavy curl of glossy black across the forehead, flanked with the frothy bosses of curls on either side, leaving the hard skin line to disclose the bungling hand of man—this is gradually giving place to higher efforts. Mark, for instance, that wig, so puritanical in its plainness, with a few grey hairs artfully cast in; see, again, what efforts have been made with the new parting, to simulate the thin rooting of the hair: and again, how its setting-on gradually fines off towards the forehead. And what shall we say to those long coils of gold which hang in such pendulous richness: these are the contributions of the poor German peasant girls to London fashionable life. Does my Amelia eke out her natural tresses with these shining snakes of glossy hair? Does my maiden-aunt Bridget hide the gradually widening parting of her once raven locks with that platted coronet? What member is there in this artful age that we can depend upon as genuine? what secret bodily defect that we particularly desire to keep to ourselves that that wicked *Times* does not show up in its advertising sheet and tell us how to tinker?

And if the individual can thus craftily be built up, imagine, good reader, the nightly dissolution. Picture your valet taking off both your legs (such things are often done), carefully placing away your arm, disengaging your wig, easing you of your glass eye, washing and putting by your masticators, and, finally, helping the bare vital principle into bed, there to lie up in ordinary like a dismantled hulk, for the rest of the night! In these latter days we are, indeed, sometimes, as the Psalmist said, fearfully and wonderfully made; and, by the author of "Frankenstein," we may tremble at our creations.

A. W.

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FLY-WHEELS TO SMOKE-BLOWERS.—We have received some letters from a working-man, pointing out what he considers errors in the application of heavy fly-wheels to hand-blowing machines:—"Almost every smith says that these machines are of no use unless they are worked by steam power. I say they are, if the revolving-wheel is as light as possible for that purpose. A boy, six years of age, can work one that I have arranged; but it takes a strong man to work the heavy one to produce the same effect. I have tried them both, and know this to be a fact. Just fancy a man having to pull 3 cwt. of wheels round, and another man only having 28 pounds of wheels to pull round. It puts me in mind of two equal men having to row a match, one man's boat to be 3 cwt., and the other man's to be 28 pounds."—*London Engineer.*

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The British government has granted a pension of £ per annum to the three daughters of the late Mr. Archer, the inventor of the collodion process in photography.

## FAIR OF THE AMERICAN INSTITUTE.

The thirty-first annual fair of the American Institute opened on Sept. 27th, at Palace Garden, corner of Fourteenth-street and Sixth-avenue. There is a great contrast between the magnificent accommodations afforded, the past few years, by the Crystal Palace and those which the society have obtained the present year. This is felt especially in the amount of room perfectly sheltered from the weather. The great fire which destroyed the Crystal Palace on Oct. 5, 1858, in the midst of the fair, plunged the institute from the summit to the bottom of their fortunes, and they will now, no doubt, resume from this point their ascending course. The exhibition this year partakes of the character of the accommodations, and is less extensive than the one which was so unfortunately destroyed last year. But it has the advantage of all being fresh and new. We see nothing more of Thorwalsden's statuary and the other old articles which had remained in the same place since the great fair of 1853. The steam-engines and other leading articles of machinery not being fully collected and in operation when this number of the paper goes to press, we shall now notice some of the other articles.

### GAS RETORTS.

J. K. Brick & Co., of Brooklyn, N. Y., exhibit two clay retorts for gas-works. Clay retorts are so decidedly superior, in one respect, to those made of iron, that they have almost wholly replaced the latter in England, and our own gas-makers have just begun to introduce them. The Manhattan Gas Company have imported a number for their enlarged works; and it seems the manufacture of them has commenced in this country. In the manufacture of gas, carbon sometimes collects in a very hard form in the retort. No mode of removing it from the iron retort has yet been found, and it consequently chokes up the retort and renders it useless. But in the clay retort, the carbon is deposited less compactly and may be burned out by simply creating a current of air through the hot retort. This is done by introducing a pipe through the door and extending it inward half the length of the retort, and opening the pipe above to let the air escape. The carbon is burned into carbonic acid and passes off in the form of gas. As the use of gas is extending to almost every town and village in the country, there can be little doubt that the manufacture of clay retorts will rapidly grow up into a very extensive business.

### CEMENT ROOFING.

We notice five different cements for roofing; one of them of gutta-percha, made by Johns & Crosby, No. 510 Broadway, this city. This they put on for five cents per foot, and warrant it to last five years.

### CARRYING-JACK.

E. Burroughs, of Rochester, N. Y., exhibits a very convenient carrying-jack. The horizontal portion rests at the ends on two turning-plates, so that when the vertical jack has been carried to one end of the slide directly over one turning-plate, by means of a bar, the other end of the slide is carried round into the line of the moving, when the jack is worked to the opposite end of the slide. By thus successively reversing the ends of the slide, the carrying may be continued in the same direction indefinitely.

### PLOWS.

The number of plows is not as great as in some previous years, but there is one on exhibition which we think is the handsomest plow that we have ever seen. It is made of cast steel, with a very sharp point and a long graceful sweep of the moldboard which makes it appear as if it would go through the ground with very little resistance. It has attached to it Stenton's "Landside-cutter," a sharp blade or wing extending about four inches from the bottom of the landside and cutting this distance under the succeeding furrow, thus enabling the plow to turn wider furrows with the same team.

### WEIGHING SCALES.

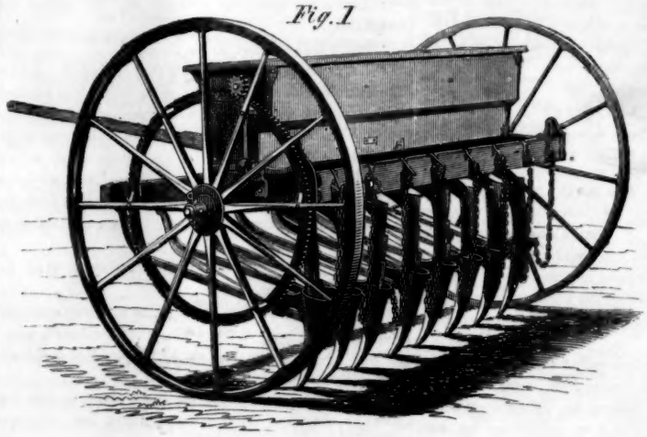
The great fortune made by Fairbanks in the manufacture of scales, has stimulated some of his Vermont neighbors to enter into competition with him. Strong & Ross have invented a scale in which the lever is attached to a rod, which it rolls. The rod is crossed by a short bar, one end of which is hung on a pivot and the other supports the platform. This scale is exhibited by Frank E. Howe, No. 191 Broadway, this city, and it is claimed to have taken several premiums over all competitors.

## IMPROVED SEEDING-MACHINE.

We present this week, illustrations of another seeding-machine which will doubtless claim its share of attention from the large farmers of the West, among whom it originated. The seed is fed out by a reciprocating slide, and the quantity is adjusted by a novel device.

Fig. 1, is a perspective view of the whole machine, Fig. 2, is a cross section of the seed-box, and Fig. 3, represents the slide for measuring the seed. A shaft, *f*, extends the whole length of the seed-box, and receives a rocking motion by means of the connection of the crank, D, with the small pinion, shown in Fig. 1. By the rocking motion of the shaft, *f*, a vertical reciprocating motion is given through the arm, *g*, to the slide, E.

*Fig. 1*

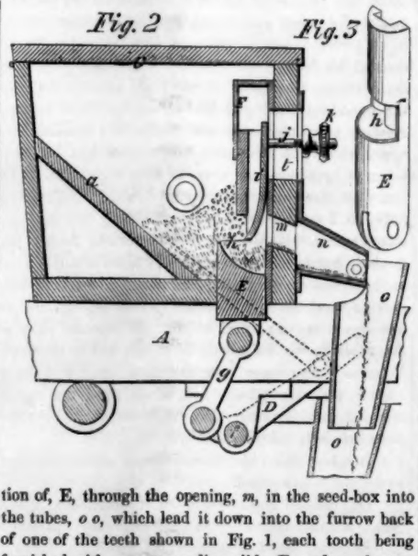


FOREMAN'S SEEDING-MACHINE.

The slide, E, is of a same cylindrical form as shown in Fig. 3, with an opening, *h*, through its front part to form a cup, as shown. A plate, *i*, extends down into the slide, E, and is bent forward, so as partly to close the opening in the front part of the slide. The plate, *i*, is fastened to the back part of the seed-box by a screw, *k*, which passes through a slot in the plate, *i*, so that the plete, *i*, may be raised or lowered, and thus the opening in the slide, E, may be varied in size, and the quantity of seed delivered be thus adjusted. After the seed is admitted into the slide, R, it is passed out at each motion of, E, through the opening, *m*, in the seed-box into the tubes, *o o*, which lead it down into the furrow back of one of the teeth shown in Fig. 1, each tooth being furnished with a corresponding slide, E, and conductors *o o*, of the seed. Motion is given to the small pinion by the large gear wheel as shown in Fig. 1. A, is the frame on which the seed-box rests, C, the top of the seed-box, *a*, a diagonal board to guide the seed back, and F, a guide in which the slide E, works.

*Fig. 2*

*Fig. 3*




The patent for this invention was granted to Daniel Foreman, of Navarre, Ohio, June 28th, 1859. Any further information may be obtained by addressing the assignees, G. W. Swerenger & Co., of the same place.

## COMPASSES OF THE GREAT EASTERN.

The engines of this noble vessel are stated to have worked with the precision of clockwork, and their motion seems not to have been disturbed by the explosion which took place on board. Her immense strength and powerful machinery have inspired great confidence in her ability to brave the storms, and make a successful voyage across the ocean. There is one little instrument which might be carried in the inside of a gentleman's hat, upon which the safety of that vessel is as much dependent as her machinery—we mean the compass. If that were to point West instead of North, the great ship might be navigated to dash unexpectedly upon a rocky shore, instead of sweeping truly and grandly into Portland harbor. On board of steamships, great local attraction is experienced on account of the machinery; and as this is in proportion to the mass of metal, iron ships exert most powerful influence on the magnet, hence the reason why several such ships have been wreck-by steering on wronged, courses, as was the case when the *Great Britain* ran ashore in Dundrum Bay some years ago. It has been a problem of vast consequence to construct compasses in such a manner as to obviate local attraction, and permit the needle to vibrate with the great earth-current of our globe. A society in Liverpool has been long in existence for obtaining facts in regard to this important subject, and the late eminent Dr. Scoresby made a voyage to Australia and back to England, for the purpose of discovering, if possible, a means of obviating local attraction, but his efforts were unsuccessful. The proprietors of the *Great Eastern*, well aware of the great amount of local attraction which must be experienced in such a mass of floating iron, put the matter in the hands of Mr. Grey, of Liverpool, a celebrated compass-maker and inspector of nautical instruments to the British Government, and he seems to have met the difficulty by applying an American invention, for which a patent was issued to Calvin Kline of this city, about a year ago. The compasses on the *Great Eastern* are described as follows in the London *Daily Telegraph*:—

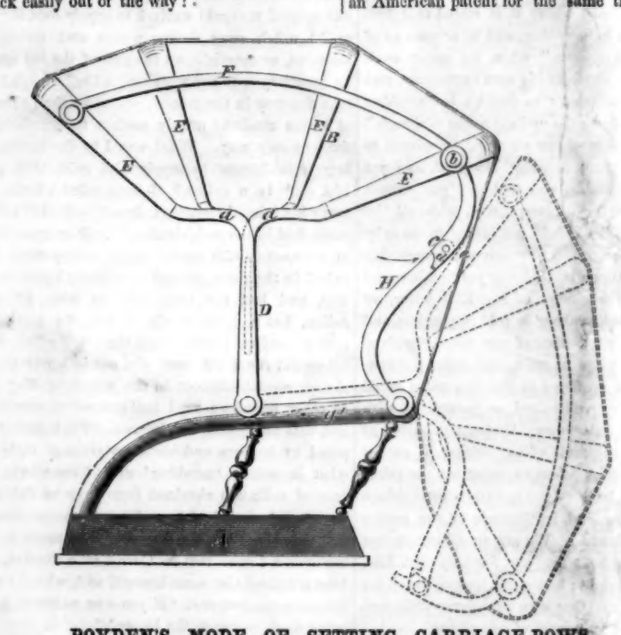
"The binnacle on the *Great Eastern* consists of an enclosed battery of magnets adjustable by vertical screws, which move the magnets according to the deviation of the compass, consequent upon the influence of iron. The extent of the deviation is detected by celestial and terrestrial observations, and when the instruments have been once perfectly regulated, the process of re-adjustment, whenever this may become necessary, is so exceedingly simple that, by merely placing the ship's head in two positions —namely, North or South, East or West—the compass in the northern hemisphere can be made perfect. If alteration of an opposite character should take place in the ship's magnetism, by reversing the position of the magnets, and adopting the same process with reference to the ship's head, the instruments can be restored to their original accuracy. To obviate the dangerous influence resulting from the heeling of the ship, an apparatus is used with a moveable vertical magnet in the center, and it is no uncommon occurence for the needle of this magnet to be deflected to the extent of 50°, and even upwards. This disturbance produces oscillation of the card whenever the vessel rolls, the frequent repetition of which eventually causes the card to revolve with such velocity as to render it worse than useless to the seaman."

In Mr. Klines' patent a battery of magnets, placed either above or below the needle, is described and claimed. The magnets are adjusted by a vertical screw, so as to neutralize the local attraction upon the needle, and thus render it reliable for the largest as well as the

smallest iron steamer that sails the seas. Our judgment thus expressed is simply formed from reading the above extract, and from being acquainted with Mr. Klines' patent, which was secured through the Scientific American Patent Agency, in England, France and Belgium, in August 1858. There may be some difference between the two compasses, but the above description would nearly answer for them both. Mr. Klines' compass was on board the *Adriatic* when she made her voyage to Liverpool two years ago, and it could then have been viewed by Mr. Grey and other persons; it has also been used in the *Africa* (Cunard steamer), and on the *Vanderbilt*, and has been found perfectly reliable in all these cases. The Winans' cigar iron-steamer, on which no common compass was reliable, has also been fitted with one of these instruments.

## BOYDEN'S CALASH TOPS FOR VEHICLES.

Railroads and steamboats are doubtless great conveniences for business-men whose aim is to be moved from one place to another in the shortest possible space of time; but if a man wants to enjoy riding, let him get a free horse and a soft-spring chaise or buggy, and bowl along on a smooth gravel road. Under such circumstances, how convenient it is to have a top that can be dropped back easily out of the way!




## BOYDEN'S MODE OF SETTING CARRIAGE-BOWS.

The accompanying engraving represents, perhaps, the simplest of all contrivances for this purpose. A represents the seat of the carriage, and *a'*, the arm at its side. From about the middle of the arm a short horizontal rod extends outwardly from the carriage, having attached to it, by a rolling joint, the upright rod, D, which is forked, or divided into two branches, at its upper end At the other side of the carriage is a similar arrangement, and the bows, E E E E, are bent over and fastened firmly at their ends to the branches of the rod, D, and may be strengthened in their position by the curved bar, F. When the top is up, it is held in position by the jointed braces, H, one at each side of the carriage, the joints being so constructed as to bend in only one direction, that indicated by the arrow, the upper part of the brace having a projection, *d*, which comes against the lower part and serves as a stop. The position of the top, when thrown back, is represented by the dotted lines, by which it will be seen that it does not fold, but remains expanded back of the seat.

The advantages claimed for this arrangement are economy in construction, greater facility in raising and lowering the top, and increased durability of the material of which the top is made.

The patent was granted to Pardon Boyden, of Sandy Creek, N. Y., on the 29th of March, 1859.

## INTERESTING PATENT SUIT

A patent case in which considerable interest was manifested by inventors and patentees was decided in this city, before Judges Nelson and Ingersoll, on the 26th ult., and judgment declared last week. The case was a motion for a new trial on the grounds of legal error having been committed by the Court in a former trial held to recover damages for the infringement of Frederick H. Bartholomew's patent (of June 20, 1854, for an improvement in water-closets) by Nathaniel Sawyer, and others. The jury awarded the damages of $3,000, on the trial at law; and the appeal now made was to get a new trial on the ground that the Court had in the former case ruled that no description in any printed publication of the thing patented could avoid the patent, unless such description was prior in point of time to the invention of plaintiff, and so charged the jury. The defendants claimed that the Court erred in so ruling and charging the jury; and that the Court should have ruled and charged the jury that if the thing patented had been described in a printed publication, before the application of the plaintiff for a patent, that this would void the patent though it might have been after the invention of the plaintiff.

Owing to some very peculiar facts developed in this case, we will add some more information relating to it, than the mere statement of the results. The question of law involved was this:—Can the use abroad, or the public description of an invention in a foreign journal, render an American patent for the same thing invalid, if the use and description have been made prior to the time when the American inventor applied for his patent? Our law, according to the decision of the Courts, is that such use abroad, and such publication cannot invalidate the American patent, unless they ante-date the period of the invention—not the date when the patent was applied for. Thus, in this case, the patent was only issued in June, 1854, while an engraving and description of a similar device had been exhibited in 1851, in the Crystal Palace, London, and in the same year it was brought out to this country. It was proved on the trial, however, that Mr. Bartholomew invented his improvement in June, 1850, and upon this proof, which ante-dated the foreign publication and description, the patent was sustained by the Court. Upon a casual examination this would seem to conflict with the decision of Judge Story, on page 730, Vol. 1, Robb's Patent Cases, in which it is stated: "Our law also requires that the use or sale should not only be with the knowledge of the inventor, but that it should be *before* his application for a patent." But the plain meaning of this is, that a thing must have been on free use and sale, with the *consent* of the patentee, to make his patent void. The patent law of 1836, Section 6, is clear upon the point of publication; no printed description of an invention can invalidate a patent unless the publication ante-dates the time when the improvement was invented, not the time when the application was made for the patent.

In reference to this feature of the patent law, Judge Ingersoll in his decision says:—"It has been urged that the proviso of the 15th section gives a different rule on this subject. That proviso is as follows: 'That whenever it shall satisfactorily appear that the patentee at the time of making the application for the patent believed himself to be the first inventor or discoverer of the thing patented, the same shall not be void on account of the invention or discovery, or any part thereof, having been before known or used in any foreign country; it not appearing that the same or any substantial part thereof had before been patented or described in any printed publication.' It is claimed that the time referred to by the terms, 'having been before known or used in any foreign country,' is the time when the application for the patent was made; and that the terms, 'had before been patented or described in any printed publication,' refer also to when such application was made, and not to the time when the original invention or discovery was made. If there were any doubt as to the construction which the proviso should receive, if considered by itself, the true construction of it would be free of doubt when considered in connection with other sections and with the whole scope of the act; viewed in such connection, it must be held that the time referred to by the terms above cited was the time when the original invention or discovery of the patentee was made, and not the time when he presented his application to the Commissioner. Any other or different construction of this proviso would be in conflict with the whole scope of the act, with the plain and clear enactments of certain parts of it, and would make several of the sections irreconcilable with each other."

The court denied the motion for a new trial, after hearing argument; the judges being of opinion that no error of law had been committed in the ruling during the former trial. A few days subsequently to this decision, Judge Ingersoll granted an injunction against Sawyer and others.

On the 15th ult., an important patent case was also tried in Philadelphia, before Judge Grier, in which the parties were the New York Wire-railing Company against Walker & Sons, Philadelphia. The application was for an injunction to restrain the defendants from manufacturing wire fences, as it was an infringement on the patent of Henry Jenkins, granted Feb. 13, 1849, and assigned to the complainants. On hearing testimony, the judge ordered that an injunction issue till further order of the Court, to extend only to making, using or selling to others to be used, beyond the eastern counties of Pennsylvania, to which the defendants claim title.

## A GERMAN INVITATION TO AMERICAN INVENTORS.

MESSRS. EDITORS:—We beg to express our best thanks for your kindness in publishing our letter of June 23d, concerning cheap sewing-machines. The publication of that letter has produced the effect desired; for various interesting communications from the United States have come to our hands, as well as advices of some specimen machines having been forwarded to us. As soon as these reach their destination, they shall be submitted to an impartial trial, and we shall not fail to answer all the letters that have been addressed to us.

Earnestly intent upon making our industrial classes acquainted with all sorts of progress in manufactures and commerce, in every country, we shall feel much obliged if you will invite all manufacturers and inventors in your great republic to communicate with us, respecting useful improvements and new inventions which they may have succeeded in effecting, to whatever branch of manufacture or production they may belong. And in return for this favor, we wish it to be remembered that, if at any time you are desirous of securing information on matters of business in Germany, we beg you will dispose of us without reserve.

*Signed* (for the Board of Trade and Commerce of the Kingdom of Wirtemberg): STEINBEIS.
Chief Commissioner.

Stuttgart, Sept. 7, 1859.

HOPKINS'S CAM PRESS.—In our description of this press, Sept. 24th, by a slip of the pen, we said that the upper disk is turned faster than the lower one by having one more tooth. It should manifestly have been one tooth less than the lower disk. The patent was issued August 23d, to Thos. R. Hopkins (assignor to himself and R. E. Robinson), of Petersburg, Va., see page 157, present volume of the SCIENTIFIC AMERICAN.

## BREAD-MAKING IN SPAIN

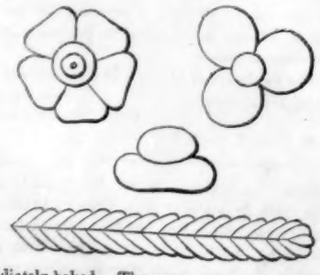
Finding myself about two leagues from Seville, in the picturesque village of Alcala de Guadaira, but commonly called Alcala de los Panaderos (or bakers), as almost all the bread consumed in Seville is made there, I determined to learn how it was made. No traveler who ever visits the south of Spain ever fails to remark, "How delicious the bread is!" It is white as snow, close as cake, and yet very light: the flavor is most delicious, for the wheat is good and pure, and the bread well kneaded.

As practical demonstration is better that hearsay or theory, I would not content myself with the description of the process of bread-making, but went to the house of a baker, whose pretty wife and daughter I had often stopped to look at, as they were sorting the wheat, seated on very low stools in the porch of their house. It was a pretty picture: their dark sparkling eyes, rosy cheeks, and snowy teeth; their hair always beautifully dressed, and always ornamented with natural flowers from their little garden in the back ground; their bright-colored neckerchiefs rolled in at the top, showing the neck; their cotton gowns with short sleeves; their hands scrupulously clean, and so small that many an aristocratic dame might have envied them; surrounded by panniers filled with wheat, which they took out a handful at a time, sorting it most expeditiously, and throwing every defective grain in another basket.

When this is done the wheat is ground between two large circular stones, in the way it was ground in Egypt 2,000 years ago, the rotary motion being given by a blindfolded mule, which paces round and round with untiring patience, a bell being attached to his neck, which as long as he is in movement tinkles on; and when it stops he is urged to his duty by the shout of "*arre, mula,*" from some one within hearing. When ground, the wheat is sifted through three sieves, the last being so fine that only the pure flour can pass throug it; it is of a pale apricot color.

The bread is made of an evening; and after sunset I returned to the baker's and watched his pretty wife first weigh the flour, and then mix it with only just sufficient water, mixed with a little salt, to make it into dough. A very small quantity of leaven is added. The Scripture says, "A little leaven leaveneth the whole lump;" but in England, to avoid the trouble of kneading, they put as much leaven, or yeast, in one batch of household bread, as in Spain would last them a week for the six or eight donkey-loads of bread they send every night from their oven.

When the dough was made it was put in sacks, and carried on the donkey's backs to the oven in the center of the village, so as to bake it immediately it is kneaded. On arriving there, the dough was divided into portions weighing three pounds each. Two long narrow wooden tables on trussels were then placed down the room, and, to my surprise, about twenty men came in and ranged themselves on one side of the tables. A lump of dough was handed to the nearest, which he commenced kneading and knocking about with all his might for about three or four minutes, and then passed it to his neighbor, who did the same, and so on successively until all had kneaded it, when it was as soft as new putty, and ready for the oven. Of course, as soon as the first baker hands the loaf to his neighbor, another is given to him, and so on till the whole quantity of dough is successively kneaded by them all. The baker's wife and daughters shape them for the oven. Some of the loaves are divided into many smaller ones, chiefly of these shapes, and



immediately baked. The ovens are very large, and not heated by fires under them; but a quantity of twigs of the herbs of the sweet marjoram and thyme, which cover the hills in great profusion, are put in the oven and ignited. They heat the oven to any extent required; and as the bread gets baked the oven gets gradually colder, so the bread is never burned.

Oh, if our English bakers would but use less yeast and knead their bread, and not adulterate their flour, how may a heartburn and fit of indigestion they might prevent! Bread would then be the staff of life, as Providence intended it to be!

They knead the bread in Spain with such force that the palm of the hand and the second joints of the baker's fingers are covered with corns; and it so effects the chest that they cannot work for more than two hours at at a time. They can be heard from some distance as they give a kind of a gutteral sound (ha, ha) as they work, which they say eases the chest. Our sailors have the same fancy when hoisting a sail.

I have kept a small loaf of Spanish bread for several months in a dry place, and then immersed it in boiling water and re-baked it, and I can assure my readers that it was neither musty nor sour.—*London Paper.*

## INDIA-RUBBER SOLVENT.

A correspondent—S. W. Ells, of Mansfield, Ohio—has become somewhat exercised in his mind, in reference to an answer which was given sometime since in our columns to correspondents, where it is stated that turpentine would dissolve india-rubber, and he accuses us of "going it blind into science" when we assert such things. He knows better from his own experience, and cites the fact that he has tried "to dissolve india-rubber in turpentine and it only swells up into a sort of dough." In proof of the soundness of our position, we quoted to him no less authority than Sheridan Muspratt, and yet our friend Ells is inexorable, and replies, "you cannot dissolve it (india-rubber) with turpentine, with all the authority you have got." We do not intend to do it by our authority, we prefer to use turpentine or some other solvent, and we insist upon it, that our position is sound and correct. Since the receipt of Mr. Ells' letter, we have dissolved some india-rubber in cold turpentine, and the solution is as perfect as that of any other dissolved gum. It is nearly as white as milk, and about the consistence of cream, and is offered to the inspection of all doubters. India-rubber vulcanized, or mixed up with clay, lead or other substances, becomes a different article, and it is not the fault of our science, if parties do not get the same results, when anything but the prime article is attempted to be dissolved by turpentine. Much depends upon the care and intelligence of the parties who make the experiments. We are unwilling to rest under such imputations as are put forth by Mr. Ells, when we know we are right; hence our reasons for giving publicity to this matter. Our own experience fully confirms, in this case, the soundness of our advice.

India-rubber is soluble in ether, in naphtha, and other liquids. A rubber cement made with turpentine dries with great difficulty, and like most turpentine varnishes, is very "tacky;" but that made with naphtha dries quickly. India-rubber naphtha cement was first used, we believe, by Charles Mackintosh, of Glasgow, for making waterproof coats, which were called "Mackintoshes," after the inventor. The folds of cloth were cemented double, leaving the natural surface on the outside, and the cement was confined between the duplicate pieces. Such clothes had an unpleasant odor, and were but little used. The discovery of rendering the rubber plastic by kneading it with heated rollers, so as to avoid the use of solvents entirely, was a grand improvement in making india-rubber goods. This discovery, together with the use of sulphur, and the treatment of the goods by high heat, are American inventions which have been the means of greatly benefiting and extending the useful arts throughout the whole world.

PASTEBOARD SHOES.—These shoes are coarse brogans, such as sell at retail for $1 and $1.25. What is usually the sole, is, in this case, only very thin, poor leather—it may be sheepskin. The welt is very thick, coarse leather, to which both upper leather and sole are sewed or pegged; the deficiency inside is supplied by thick yellow pasteboard. The shoes thus appear to have very good stout soles. A very little wear carries away the thin skin of a sole, and the yellow pasteboard presents itself, and the cheatery is thus exposed, too late for the purchaser. We have seen all this.—*Shoe and Leather Reporter.*

## SUBSTITUTE FOR HAY AND TURNIPS.

It is a subject of much importance to our farmers, especially those engaged in the dairy business, to obtain the best food for their cattle, as a substitute for hay and turnips. A correspondent Edward Carrol, furnishes the *Irish Agriculturist* with his experience in this deparment, which we condense as follows:—

"First, what shall we do for hay? Let us economize everything; and turn to account many things, hitherto either neglected, or thought to be comparatively worthless. Every particle of chaff, whether of wheat, oats, or even of barley, should be scrupulously economized and converted into food for horses and cattle. To some this advice may appear a novelty, to many others it is no such thing. During my several agricultural tours throughout the various parts of England, some years ago, I saw it a common practice to have large barns filled with the awns of barley, reserved to be cooked for horse-feeding or to be cut with the chaff-cutter, mixed with hay for the feeding of store-cattle. Some of the best conditioned store-cattle I saw were fed on the awns of barley. Such small farmers as had not stock of their own to use these awns sold them to the larger farmers. In the year 1848 I had charge of the large farming-establishment at Clongowe's Wood College, county of Kildare. We had a fine crop of mangold wurtzel to supply food for some 40 or 50 milch cows during winter and spring. By an omission, or oversight, on the part of the old steward, he let (contrary to to my warnings) a hard night's frost overtake the crop in the ground, and more than three-fourths of it was rendered utterly useless for cattle-feeding in the ordinary way. What was I to do having such a large establisment to supply with milk, then selling at 10d. and 1s. a gallon? I husbanded all the chaff of every kind in the place, I bought all the mill-chaff I could find in the neighborhood, built temporary cisterns in connection with an old steaming-apparatus I got repaired in the place, cooked everything I could find available, and had not only milk at from 4d. to 5d. per gallon, but a good supply of food for some 80 or 100 pigs in the liquid spared from the cow-feeding, and never before did the milch cows turn out in better condition in the same establishment in the month of May. I have on other occasions used half-ground or crushed barley and oats for feeding milch cows. The material was prepared as brewers and distillers prepare their malt, by what is called 'mashing' and fermenting; and increased milk was obtained from cows so fed, and they were nearly fat when turned out to the summer's grass. I lay no claim to this discovery, the merit is due to a gentleman I once met in Cork Cattle Market, who had long practiced the same himself, and, who, in giving me his opinion, observed: 'If you can malt the grain before being used, so much the better.'"

IRON VS. COPPER BOILER-TUBES.—The use of copper and brass flues in the boilers of the steam fire-engines, has been found, by practical experience, to be unsuitable, in consequence of those metals not possessing the same expansive power as iron when heated, which tends to loosen the fastenings of the flues to the iron portions of the boiler after cooling, causing leakages and difficulty in getting up steam. The "Hibernia" steam fire-engine is now at Reany, Neafie & Co's, having her old boiler-flues taken out, and iron ones substituted, which are found to work better, the expansion and contraction, when all is constructed of iron, being properly equalized. The "Northern Liberty Hose" steam fire-engine, and the "West Philadelphia," have been altered in the same manner, with advantage.—*Philadelphia Ledger.*

NATIONAL ASSOCIATION OF RAILROAD ENGINEERS.—This association held its fourth annual meeting at Pittsburg on the 13th and 14th ult. Its principal object at present is to obtain legislative enactments in the different States to ensure a higher standard of qualifications in applicants for the position of railroad engineers. At this meeting the association had under consideration and approved of a draft of a proposed law, looking to the accomplishment of this object in Ohio. This bill was presented to the Ohio Legislature, at their last session, and passed the House before adjournment. A similar bill will be offered to the legislatures of Pennsylvania, Illinois and Massachusetts, at their next sessions, and subsequently to the legislatures of other States in which the association have branches.

## THOUGHTS ON THE PROGRESS OF SCIENCE.

MESSRS. EDITORS:—Since I had the pleasure of receiving the back numbers of your interesting and instructive journal, I have shown specimens to several influential manufacturers and intelligent mechanics in this vicinity. One man told me that he had twice obtained $5 for a single recipe that he copied out of the SCIENTIFIC AMERICAN, which he has taken regularly for several years; and I presume this is not an isolated case, by many hundreds. It is just such journals as yours that are annually condensed into encyclopedias, the compilers of which roughly scoop off the cream of all the new discoveries in science and art that have been recorded in the columns of various periodicals during the year; but the facts set forth in such annual works are often so mutilated or distorted in the condensation and so meager in outline as to be practically of no value. Every mechanic and farmer in the land should subscribe for the SCIENTIFIC AMERICAN, not only for his own benefit, but also that of his children; he may have a Franklin or a Fulton, a West or a Watt, in that little marble-player whom he pets in his leisure hours; and the natural bias of the child's mind toward mechanical or agricultural pursuits requires to be confirmed and further developed by intellectual nourishment of such a quality and quantity as can be derived only from a journal like your own.

Many a gigantic mind has derived its first electric stimulus from a brief hint in some periodical devoted to the dissemination of mechanical or agricultural knowledge. Some of the greatest discoveries have originated in the simplest and most common occurrences. Newton's theory of gravitation and Galvani's discovery of the science which bears his name are shining examples. Sails are said to have been suggested by the structure of the shellfish *nautilus*; paddle-wheels, by the webbed feet of aquatic fowls; screw-propellers, by the tails of certain fishes, &c. Steamboats, locomotives, balloons, telegraphs, printing-presses, fire-arms, reapers, sewing-machines and daguerreotypes have been wonderfully improved in the last fifty years; some of these had no existence anterior to the dawn of the present century. Although the sad experience of such men as Fitch, Cort and Hunt prove that original inventors of great discoveries sometimes derive little pecuniary benefit from their labors; yet the fruit of their genius almost always confers both gold and glory upon their children, and history immortalizes them as having been benefactors to the human race, and awards them, in the estimation of posterity, far greater honor than is ever given to kings or emperors.

The knowledge of effects (or *facts*) and their causes, together with the manner in which they mutually effect each other, is what constitutes all science; art is the practical application of the principles deduced from that knowledge to the useful purposes of life. Independent of the practical utility of the study of natural philosophy to the world at large, in ministering to our comforts and luxuries, it is the sumptuous "feast of reason" for the nourishment of the master-minds who are ever seeking to penetrate the arcana of Nature. Such men as Sir David Brewster do not need to be millionaries; they are, indirectly, the directors of the wealth of the world.

I am glad to see the names of many southern inventors frequently published (in your journal) as successful patentees; because the tendency of the southern mind has hitherto inclined more to physical than mental development. Commerce, ship-building, navigation, wheat and grass culture, cattle-raising, and large manufacturing depots, will ever give the pecuniary ascendancy to that section of country in which they flourish.

Let me encourage you, gentlemen, in your great enterprize. Perhaps, we need light and elegant literature; we may even need "chess columns;" but let the SCIENTIFIC AMERICAN continue to teach the people how to realize Dean Swift's prayer—"make *two* blades of grass grow on the spot where only *one* grew before;" let it still increase the mechanical and agricultural knowledge of our artizans and farmers, by publishing the latest discoveries in science and improvements in the arts; and then its editors will have the noblest reward—that of being considered the "guardian angels" of genius, the champions of inventors, and the "prime motors" employed in developing the highest physical and intellectual resources of this great country.

W. A. SHAW, M.D.

Camden, Ark., Sept. 30, 1859.

## THE ATLANTIC TELEGRAPH.

MESSRS. EDITORS:—Having examined with some care a piece of the old Atlantic telegraph cable, I have detected three scientific errors in its construction, either of which was sufficient to defeat the practical telegraphing through its entire length when laid in the ocean.

The first error was the surrounding of the insulating material with such a quantity of iron wire for strength and protection, when like results could have been secured with material of a non-conducting character. If the cable had only been 1.50, the specific gravity of the water, it would have sunk slowly into its ocean bed without the great strain on it which was experienced, owing to its excessive weight.

The second error was the using of gutta-percha as an insulator, also pitch and resin, in part of the coating. Each of these substances is more or less porous, and absorbs water under favorable circumstances, especially great pressure of water for a continued length of time. India-rubber is not such an absorbent of water as gutta-percha, nor is it so liable to chemical changes; it is, therefore, a superior insulating agent.

The third error, and by far the most important, was the faulty mechanical arrangement of the copper conducting wires. These consisted of seven small strands twisted into a cord from right to left, making one convolution in every one and a half inches of the whole length of cable. One of these wires formed a core to the other six which were twisted around it, and of course it was straight. The six twisted wires, therefore, were five-eighths of an inch greater in length to the yard than the interior one, and this amounted to fifteen miles in the thousand, and forty-five in the entire length of the cable. Here, then, was a cable constructed with its interior conducting strand forty-five miles shorter than any of the other six conductors. As the electric current in a conductor always passes on the shortest circuit and moves through equal distances in equal spaces of time, it followed as a necessary consequence that the current on the short interior strand of the cable traveled forward—to use a plain term—in advance of that of the other six wires. Therefore, when the current from the one wire reached its terminus, the usual counter-induced current was produced in advance of the positive current in the six spiral wires, thus tending to neutralize their action. This may account for the uncertainty and peculiar unreliable vibrations of the galvaniscope which were witnessed when the cable was first laid. A very powerful negative current was no doubt also produced in the center wire by the direct positive current in the other wires when the two met, thus causing galvanic reaction in the entire circuit.

In forming another cable great care should be exercised to have one large and strong conductor only, or if several are employed, they should be laid parallel so as to have them of an equal length throughout the whole extent of the cable. Or if several strands of wire are chosen and the spiral form desired for strength and flexibility, three large No. 12 or 14 wires, or the multiplicands of this number of small wires of the size in the cable, would doubtless answer. These can be twisted without a core and all be of equal length, so as to pass the current with a unity of speed, and thus prevent reaction in sending messages from shore to shore across the great Atlantic.

J. H. T.

New York, Oct. 5, 1858.

## WATT'S STEAM-ENGINE IMPROVEMENTS.

In answer to the inquiry of a correspondent respecting the principal contributions made by James Watt to the steam-engine, we present the following summary, which for convenience of reference will be useful to all our readers:—

1. The condensation of the steam in a vessel distinct from the cylinder, which was thereby always kept hot.
2. Removal of t he air and water from the condenser by an air-pump.
3. Producing the movement by the force of steam instead of by the air's pressure.
4. Cutting off the steam before the completion of the stroke, thus saving steam and equalizing the motion of the piston (expansively-acting engine).
5. Giving the piston an impulse or moving power in ascending as well as descending (double-acting engine), and invention of the parallel motion.
6. Converting the alternate rectilineal (reciprocating) motion of the piston into a continuous circular motion by the sun-and-planet wheel or crank, so as to adapt the engine for impelling machinery.
7. Application of the governor and throttle-valve, &c., to render the motion smooth and uniform.

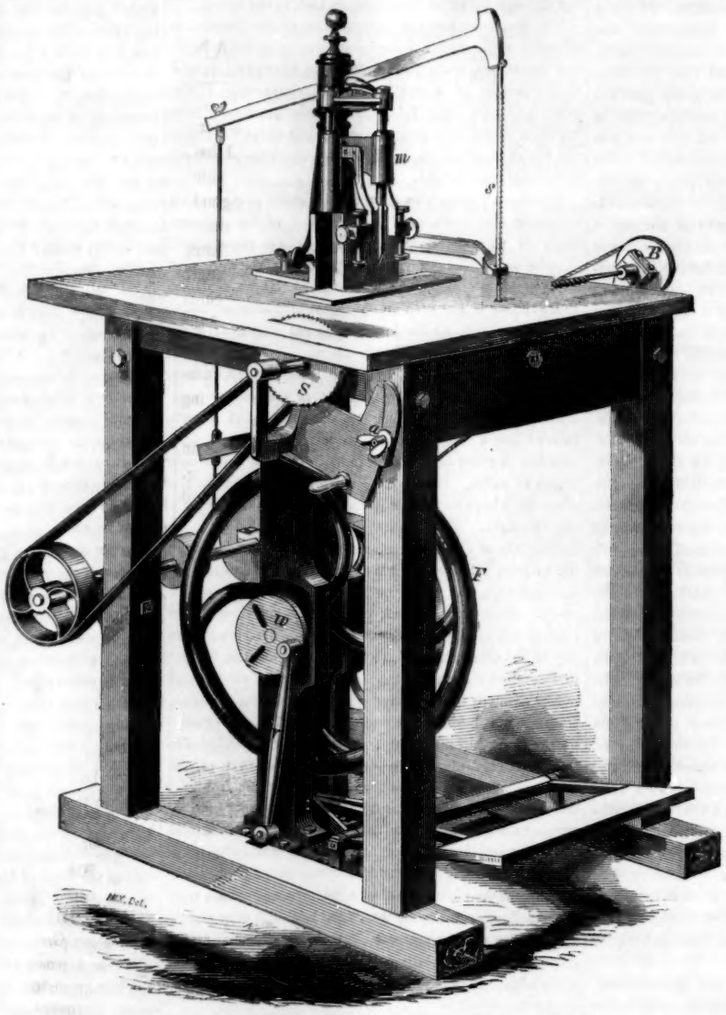
## A COLUMN OF INTERESTING VARIETIES.

At Fort Monroe, Va., a party of United States soldiers are employed in a very novel manner. They are trying to wear out an old gun which weighs no less than 15,000 pounds. 10 pounds of powder and a ball weighing 123 pounds constitute the charge, and with this tremendous load it has been fired over a thousand times. Near it are two guns which were discharged 2,000 times at Pittsburgh. The object of the firing is to test the durability of the iron; and, as to satisfactorily ascertain this, the gun must be worn out, the soldiers are destined to hear thunder for some time.....The year 1609 is for ever memorable from Galileo's discovery of the telescope. Being at Venice his house was thronged with visitors to satisfy themselves of the truth of the wonderful stories told of his instrument.....Boswell observing to Dr. Johnson that there was no instance of a beggar dying for want in Scotland, "I believe, sir, you are very right," says Johnson, "but this does not arise from want of beggars, but the impossibility of starving a Scotchman."....A few years ago, a small island was thrown up by volcanic action in the Mediterranean, in sight of a man-of-war. The captain took possession of it, but scarcely had he planted the British flag on this territory, so strangely upheaved from the waters, when the whole fabric disappeared, and left not a fragment behind.....One of the anthracite hot-blast furnaces of the Lehigh Iron Crane Company, at Catasauqua, Pa., made 6,207 tuns of pig iron in the 26 weeks ending June 30, or nearly 239 tuns per week. The London *Engineer* says this is unprecedented.....Gutta-percha is vulcanized with sulphur in the same way as india-rubber .....In the Berlin Arsenal are two leather guns used by Gustavus the Great, in the 30 years' war.....On the St. Germain Railroad, in France, the pay of first-class engine-drivers is $65 per month.....In the museum at Dresden is a tube, many feet long, formed by lightning falling upon a bed of sand, which has been partially melted by the electric fluid.....A tunnel of 24 miles' length is in progress from Freiburg to the Elbe, at Meissen, for the purpose of draining the mines around the first-named place.....In the historical collection at the Palace of Berlin there are two cannon-balls, each with one side flattened, said to have been fired by opposite parties at the siege of Magdeburg, and to have met together in the air.....There are few operations going on at the earth's surface which are not more or less influenced by atmospheric pressure. The pressure of the atmosphere was discovered in 1643, by Torricelli, who also invented the barometer, the discovery being confirmed by an elegant experiment devised by Pascal. The air pump was invented by Otto Guericke, a magistrate of Magdeburg, about the year 1650. In the vacuum of an air pump, liquids boil at about 140° Fah., lower than when exposed to the ordinary atmospheric pressure.....Three of the masts of the *Great Eastern* are made of hollow iron in eight-feet lengths, strengthened with diaphragms. Between the joints, as they were bolted together, were placed pads of vulcanized india-rubber, to render the masts elastic. The four engines which drive the paddle-wheels of this steamer are oscillators, of 14-feet stroke. .....By Lord Rosse's telescope objects 100 feet high on the moon can be distinctly seen.....A cubic foot of distilled water weighs 997.136 oz., or, in round numbers, 1,000 oz.....Dr. Ernst Alban at one time worked a steam-engine in London, to a pressure of 1,000 pounds to the inch.....In the lace manufacture, one man with the machine does the work of 8,000 workers on the cushion.....The engines of the packet-steamers running between Southampton and Havre have each three cylinders, open at the top, the steam acting on one side only of each piston.....Steel swells in hardening. Iron absorbs carbon and swells in case-hardening, as well as in conversion into steel. Forgings of scrap iron are liable, in case-hardening, to absorb unequally, and to twist or warp, owing to the irregularities of the iron.....The weight of ice is 94 per cent of an equal bulk of water .....An instance is on record of 1,000 bricks being well and permanently laid in one hour by a single workman. This was done for a wager, nearly 50 years ago, in the front of the old City of London tavern, now the site of the Wesleyan Centenary Hall.....The great aqueduct at Roquefavour, in France, is 270 feet high, and 1,320 feet long. It is formed of three rows of arches.....Integrity, however rough, is better than dissimulation.

## KAEFER'S MODE OF TRANSMITTING MOTION.

The accompanying engraving represents a bench in which are combined a circular saw, a scroll saw, a borer, and a mortising-machine; each arranged so as to be readily removed out of the way, and all worked by one treadle, in combination with a peculiar fly-wheel, for which Letters Patent were granted in the United States to Mathaus Kaefer, of New York City, May 5, 1857, and May 31, 1859. Patents have also been secured in Great Britain.

S represents the circular saw; and *s*, the scroll saw, B, the borer, and M, the mortising-machine. By loosening the set-screw, *a*, the circular saw may be let down below the upper surface of the bench, the borer turns down by a similar arrangement, the scroll saw, *s*, may be easily unrigged and removed, and the mortising machine may be thrown out of gear by pressing on the end of the rod, *n*, or it may be entirely removed from the bench by loosening the thumb screws with which it is fastened. The axle on which the fly-wheel, F, runs, passes through journal boxes which slide up and down in the frame, and its end is seen in the center of the wheel, *w*. The rod, *r*, is connected at one end by a loose pin with one edge of the wheel, *w*, and at the other end to the frame of the machine. Thus, when the journal boxes are pushed up by the treadle, the wheel is both raised and turned, and motion is thence imparted to the machinery. By this arrangement, the fly-wheel has not only a rotary but also a vertical, reciprocating motion, combining the action of the fly-wheel with that of the pile-driver or hammer. If, where the resistance is variable, the parts are so adjusted as that the wheel with its journal boxes, shall be coming down at the time of the greatest resistance, as when the chisel is cutting the wood, for instance, it will concentrate the power more perfectly on the point of resistance than will a fly-wheel of the same weight, running on a stationary axle.



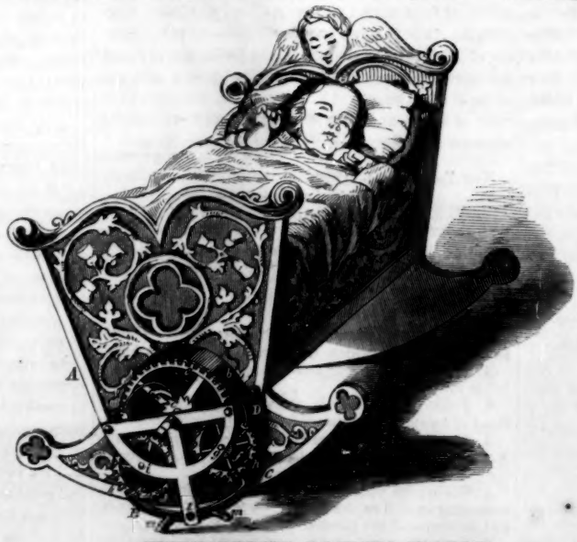
KAEFER'S MODE OF TRANSMITTING MOTION.

These machines are made by the Kaefer Power Company, at room 26, in the large building of the Harlem Railroad Company, corner of Franklin and Elm streets, New York. For further particulars address the company as above.

## TEWKSBURY'S ROCKING-CRADLE.

We live, in this age, by machinery. Our wheat is sown and reaped and threshed and ground by machinery, the bread is mixed by machinery and baked by steam. Our clothes are made, our carriages are drawn, our boats are paddled, all by machinery. It is not strange, then, that infants should be rocked to rest in their cradles by means of machinery. Several patents have been granted for devices for this purpose, the latest of which is illustrated in the annexed cut.

To the end of an ordinary cradle, A, is attached the clock-work, D. The spring, *b*, is secured to a shaft, *c*, and is wound up by a suitable key. Attached to the same shaft, *c*, is a spur wheel, *e*, which gears into a pinion, *f*, and this pinion is secured to an arbor, *g*, to which an escapement wheel, *h*, is rigidly fastened. Motion is imparted from this arbor to an arbor, *i*, by means of two cog wheels, *j j'*; the wheel, *j*, being fastened to the arbor, *g*, and the wheel, *j'*, to the arbor, *i*. Secured to this latter arbor is the second escapement wheel, *k*, both of these escapement wheels, *h*, and *k*, striking with their outer teeth against the hooked ends, *h'*, and *k'*, of the verge, E, which is secured to the rock-shaft, *l*. Attached to the inner side of this verge is an arm, F, the ends of which are bent down so as to form two prongs, *m*, which reach down to the floor, and rest upon it.



TEWKSBURY'S ROCKING-CRADLE.

The operation is as follows:—When the cradle is placed on the floor, the prongs, *m*, of the arm, F, keep the verge, E, in a horizontal position, and if by the action of the spring, *b*, the escapement wheels, *h*, and *k*, begin to rotate, one of the teeth of the wheel, *k*, will strike the hooked end, *k'*, of the verge with its rounded side, and that side of the cradle to which the escapement wheel, *k*, is secured will rise until the tooth clears the end, *k'*. One of the teeth of the wheel, *h*, will then come in contact with the hooked end, *h'*, of the verge, and the cradle will be thrown the other way; thus, by an alternate action, rocking the cradle. A lock or pawl may be dropped into one of the gears to stop the motion when desired.

The patent for this invention was granted to W. D. Tewksbury, of Cuylerville, N. Y., June 7, 1859.

## AMERICAN AND ENGLISH LOCOMOTIVES.

The following are some further details of the trial of American and English locomotives noticed by us in our last issue. This trial of two English against two American locomotives (built at Rogers' Works, Paterson, N. J.) took place on the Southern Railway of Chili, S. A., and resulted in a complete victory for the latter The English engines were built by R. & N. Hawthorne, Newcastle, and were each 27.61 tuns. Prior to the trial an English engineer, by the usual formula, calculated the traction of his engines as exceeding that of the American by 12 per cent, but practice dissipated all confidence in such calculations. The "San Bernardo" locomotive (American), on the 1st of last July, took a train of 35 eight-wheeled cars, weight 587 tuns, from Santiago to the summit of the incline in the railroad, 11 2-3 miles, in 41 minutes. The English engine "Varas" tried to take the same train up the same route, on the subsequent day, and failed to do so, not being able to raise sufficient steam. On the 3d of July the English passenger-engine "Montt" started from the Santiago station with a train of 15 loaded eight-wheeled cars, gross weight of train, 288 tuns, and run to the summit of the incline in 37 5-6 minutes, including one stop of 3 1-4 minutes. The whole length of the route is 17 miles, which was run in 49 minutes.

The American engine "Santiago," on the next day, took a similar train of 290 tuns to the summit in 26 1-10 minutes, making a stop of one minute, and it run to the end of the route in 34 1-2 minutes, The fire and heating surface of the Hawthorne engines were as follows. Fire surface, 1,123 square feet, tube surface, 1,123 square feet, and 2,927.16 cubic feet of steam were used per mile. The American engines had 783 square feet of fire surface, 706 of tube surface, and used 2,613.23 cubic feet of steam per mile. We have not been informed of the causes of superiority in the successful engines, but there was a distinctive difference in the size and stroke of the cylinders, the English being 15 by 22 inches, the American, 14 by 24 inches. The results of this trial have created lively satisfaction among the American engineers in Chili, and at home. The judge of the occasion was an English practical engineer named Bailey, who presided and judged very fairly.

A NEW chimney is about to be erected in Glasgow, which will be about 460 feet high—the tallest chimney in the world.

# Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY
At No. 37 Park-row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Two Dollars per annum.—One Dollar in advance, and the remainder in six months.
Single copies of the paper are on sale at the office of publication, and at all the periodical stores in the United States and Canada.
Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.
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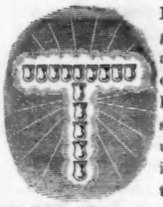
VOL. I., No. 15.....[NEW SERIES.].....*Fifteenth Year.*

NEW YORK, SATURDAY, OCTOBER 8, 1859.


## A VISIT TO THE MANHATTAN GAS-WORKS.



THE manufacture of illuminating gas is a very simple operation; and as this substance is now in daily, or rather nightly, use by a very large portion of the community, we suppose our readers would like to understand how it is made. Having recently gone over one of the two large establishments of the Manhattan Company, in this city, we are able to give a reliable description of the process, which we shall do with the utmost brevity possible.

Illuminating gas is made by subjecting bituminous coal to a red heat in a tight retort for the space of five hours, during which time the coal is decomposed and the gas is driven off through a pipe which communicates with the retort. When the hot gas is first driven off, it is mingled with three other compounds (tar, ammonia and carbonic acid), either of which would injure its illuminating properties, and which have to be separated by three different processes. The tar is condensed by cooling the gas; the ammonia, being readily absorbed by water, is removed by exposing the gas to a shower bath; and the carbonic acid is separated by passing the gas through successive layers of dry lime.

The apparatus by which the several processes are performed is, though extensive, very simple, and we can, in a few words, give a clear idea of it. The retorts are made of iron or clay, 7½ feet long, of semi-cylindrical or D shape, with the straight side at the bottom. Five of them are set over one furnace, in one bench as it is called, though the benches are joined together, forming one long pile of masonry, with the retorts facing outward on both sides. The inner end of the retort is cast solid and tight, but the outer end is made open, and is closed by a movable door or plate. The retort is kept at a cherry red heat, and when the time arrives to change the coke in it for fresh coal, the workman removes the door and hauls out the red-hot coke with an iron hoe into an iron wheelbarrow, when it is wheeled away and extinguished with cold water. A long iron shovel, shaped somewhat like a grocer's scoop, is filled with fresh coal, two men place a crooked iron bar beneath it, while a third takes hold of the long handle which extends directly from the end; the scoop is lifted and entered into the retort and pushed home to the end, when it is turned over and withdrawn. Each retort is charged with 150 lbs. of coal, and when it is charged the door is taken up from an iron wheelbarrow, by which it has been brought, readily prepared with a channel full of moistened clay or loam around its edge, and is screwed against the end of the retort by a clamp which takes hold of a flange on the the end of the retort. The heat immediately begins to expel the gas, which continues to pass off for five hours. It passes up a pipe which communicates with the retort, and is bent over into a long cylinder, passing down under the surface of the water with which the cylinder is partly filled. The object of this arrangement is to prevent the gas from flowing back from the main reservoirs and escaping through any one of the retorts while it is opened. The gas bubbles up through the water in the cylinder last mentioned, and flows on through a large pipe to the condenser.

The condenser consists simply of a series of large long pipes standing vertically over a vessel of water, and so divided that the gas must pass through them in succession. The tar is condensed and runs down into the water, and is drawn off through a stop cock. About 10 gallons of tar are produced from a tun of coal. To remove the ammonia, the gas is carried to the shower-bath or scrubber. This consists of a large upright cylinder, filled with successive layers of coke supported on horizontal lattices, with a jet of water coming in in spray at the top. The gas is admitted at the bottom, and as it struggles up through the wet coke the ammonia is brought into contact with the water and is absorbed by it. The purifier for removing the carbonic acid is a series of three large low boxes, some two feet high and eight or ten feet square, with a tight cover which can be lifted off by means of a pulley, block and tackle. The burnt lime is spread about three inches thick on a series of iron plates, which are perforated with numerous holes. The gas being admitted below passes up through the lime with which the carbonic acid combines, forming carbonate of lime, the same substance as the limestone before it was burned. This is sold to farmers as a fertilizer. From the purifier the gas passes into the great receivers, and is ready for distribution to the elegant parlors, the dirty workshops, the sad sick chambers, and the noisy drinking cellars of the great city.

In the large and elegant laboratory connected with these great works is a perfect gas-work in miniature, for making gas in small quantities from different kinds of coal, in order to test the coal. This test gas is then conducted into a dark room and its light is accurately measured by means of a photometer. The photometer in use at this establishment is the invention of a gas engineer of Liverpool, and is a beautiful device. It consists simply of a disk of paper, one portion of which is oiled and rendered translucent, while the remainder is left unoiled and opaque. The disk slides on a long graduated bar, which has the standard spermaceti candle (burning 120 grains an hour) at one end, and the standard gas-burner (a five-feet Argand burner, 15 holes, 1-23 inch diameter, 7-inch chimney) at the other. If the paper is placed very near the candle, on looking at the side next the candle, we see the opaque portion of the disk much brighter than the oiled portion, the quantity of light from the candle which is reflected being greater than the quantity from the gas which is transmitted. On looking at the other side of the paper, the oiled portion presents the brighter appearance. The paper is slipped along until the distinction between the oiled and opaque parts disappears, and all portions present a uniform brightness which is seen on both sides, when the comparative distances between the paper and the candle, and the gas and paper, being measured by the graduated bar on which the paper slides, a simple calculation gives the quantity of light emitted by the gas as compared with the candle.

The manufacture of coal-gas is one of the many arts which have grown up within the present century. It was first made at Redruth, in Cornwall, England, by William Murdoch, a Scotch engineer, who lighted his house and offices with it in 1792. Improvements continue to be made in the manufacture, the latest important one being the use of clay instead of iron for retorts. English coal has heretofore been almost exclusively used in this city for gas, but American coal is now being gradually substituted.

## DEATH OF BRUNEL.

Lately the news came bounding gladly over the waters of the Atlantic, detailing the success of the *Great Eastern* on her first trip, but swiftly on the heels of this came other intelligence of a sad character, having a close connection with this event. When shouts of joy were reverberating along old Albion's chalky cliffs as the mighty steamship moved majestically down the classic Thames, tears were falling fast for her projector, Mr. Isambard K. Brunel, C. E., who at that period was sinking in the arms of death from paralysis. He departed life on the 16th ult., like a general struck down with the shouts of victory ringing in his ears. He was the son of M. I. Brunel, a French royalist and a man of wonderful inventive powers, who had to flee from his native country, in 1793, and found refuge in this city (New York), where he was engaged for several years as a surveyor, engineer and architect. Having invented a machine for turning irregular forms, and specially adapted for making ships' blocks, he went to England, and the British government at once employed him to put up his machinery at Portsmouth, and from that moment he became a justly conspicuous character. His distinguished son, now deceased, was born in Portsmouth in 1806, and received a collegiate education in France, where his father sent him. Having a taste for engineering, he devoted himself to this profession, and was first employed as assistant to his father in the Thames Tunnel. He also was of an inventive turn of mind, and in 1826 became a patentee for an engine to be driven by carbonic acid gas. This was shortly after the gas had been liquified by Sir Humphrey Davy, and when there was a most intense excitement regarding it superseding steam, because it was so sensitive to heat; but it was a failure in practice. He was a man of great ideas, and seemed to delight in mighty projects. He designed the Great Western (7-foot broad gage) Railroad, the most magnificent line in the world; also the steamship *Great Britain*, the largest known when built; and now his life concludes with the completion of the greatest naval wonder the world has ever seen. Mr. Brunel was also the engineer of the Tuscan portion of the Sardinian railroad, and he built the Hungerford Suspension Bridge over the Thames, at London, which is said to be the largest span in England, and is a model of elegance. He was a man who had great self-confidence, and this was manifested in his controversy with George Stephenson in regard to the comparative merits of the broad and narrow gage railroads, called "The Battle of Gages," which agitated Parliament and the whole country for several years; but experience has proved that Stephenson was correct. Being very enthusiastic as well as ingenious, he committed many mechanical and scientific errors by overlooking some important feature which ought to have been taken into calculation. Thus, when the steamship *Great Britain* was built, lo! and behold, the dock had to be dismantled before it could be launched; and he was also unfortunate at the first launching of the *Great Eastern*. At one period, atmospheric railroads were taken up by Brunel, Dr. Lardner, and several other great men, and it was argued they would soon supersede locomotives and steam. Two lines of such railroads were actually built and opened in England in 1845, and General Pasley, the government engineer, reported in favor of this mode of transit. In three years the atmospheric railroads were abandoned, their air tubes were pulled up, and among the rest, the huge one by Brunel on the South Devon Railroad. But there never lived a great man—engineer, inventor or statesman—who did not commit many errors; and although Brunel had his faults, still he was a great engineer and inventor, and he has left behind him many works which will endure for centuries, as a testimony to his skill and genius; and it is to be hoped that his great ship will long plow the waters of the ocean, in safety and with success, as the noblest monument of them all.

## THE AMERICAN SCIENTIFIC ASSOCIATION.

Under this title a correspondent (S) of the *Railway Review*, of the 15th ult., makes an attack upon all the papers which presumed to criticise unfavorably some of the proceedings of the above association at its late convention. Of us he says, "One paper of large circulation and considerable influence, and moreover, calling itself *scientific*, is pleased to say: 'In reading the proceedings of the Scientific Association we are driven to the conclusion that it is directing itself in a great measure to useless scientific objects. It is a waste of mental power, and a misdirection of learning to enter upon long disquisitions on the tails of comets, or whether the curious tracks on the Connecticut red sand-stone are those of an extinct kangaroo, or of a goose.'"

These quotations are taken from page 137, Vol. 1, New Series, SCIENTIFIC AMERICAN, and they seem to have shocked the moral sensibilities of this writer, as he says respecting them: "To my mind this approaches very nearly to blasphemy." How our language should thus have affected him he gives no good reason; indeed he does not seem to comprehend its very plain meaning. In the "middle ages" the school-men held many long and grave discussions as to the possibility of two spirits occupying the same place at the same instant of time, and to have questioned the utility of such intellectual absurdities, as we have done of some of the speculations at Springfield, would, no doubt, have been called blasphemy by persons entertaining just such views as the correspondent of the *Railway Review*. It is very plain to any candid and careful man that our remarks only reflected upon the waste of time and learning exhibited by members of the association in speculative and curious philosophy, to the exclusion of experiment and strict induction,

and every unbiassed man will sustain us in this position. Men eminent for talents and scientific attainments frequently fly off at tangents and waste both time and learning in profoundly useless speculations. Let us give a case to the point. A few years since one of the most distinguished professors in Oxford published an anonymous tract on the "Plurality of Worlds," in which he attempted to prove scientifically that the Earth alone was inhabited, and that none of the other planets were in a fit condition for the existence of sentient beings. To this pamphlet the Rev. Baden Powell, F. R. S., published a long reply, and Sir David Brewster, another, in a volume of no inconsiderable size. The latter *savant* (whose work has been re-published in this city) endeavored to prove scientifically that not only the planets, but the very Sun itself may be inhabited. We believe there is not a man of plain common sense in our land who can doubt the assertion, that the efforts of these very eminent scientific gentlemen, on this subject, were a "waste of mental power, and a misdirection of learning."

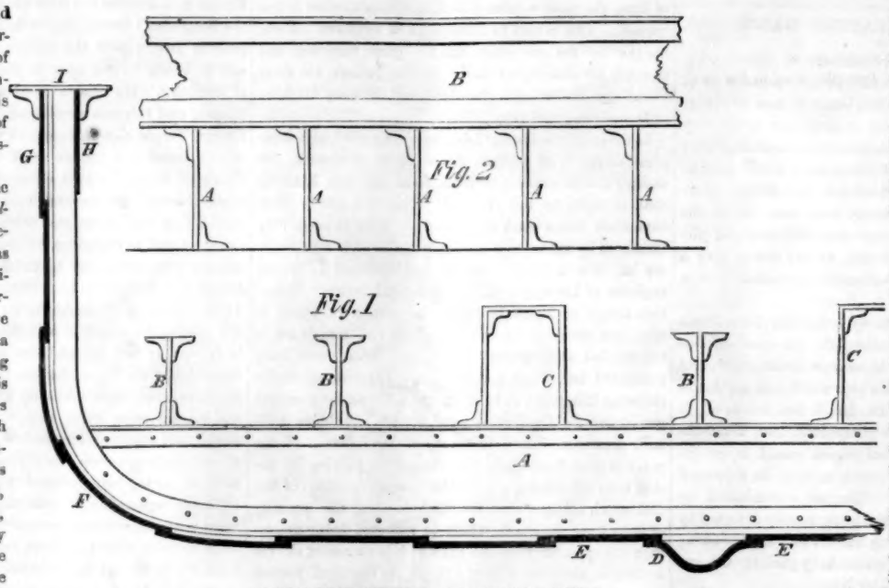
It is evident that the correspondent of the *Railway Review* is not a frequent controversialist, as he takes cases from experimental philosophy as arguments for speculative philosophy; he is like a counselor using opposing evidence in proof of his case. Thus, he cites Franklin's experimentwith the kite and the lightning, and Prof. Henry's with the electro-magnet, as bearing against us, while they are the very kind of investigations we have commended. Science is built on truths, but some truths are certainly more valuable than others, just as a man "is of more value than many sparrows." We have spoken against the undue prominence given to certain scientific subjects of little value, because they excluded the consideration of others possessing more importance. By elevating paltry scientific subjects to a position with those of paramount consequence, general science is subjected to contumely. The correspondent of the *Review* exalts the speculators in the fossil foot-prints to the dignity of benefactors to the coal-miners who furnish fuel for our engines, and as a sequence "newspaper makers" are also held to be the recipients of their benefactions. We exclude such an idea; we consider the miner to be the geologist's "best friend," not the latter the best friend of the former, as he has been called.

The correspondent of the *Review* is in error, we believe, in one statement. He says: "The mere apparently useless truth that the tubes of the cellular tissues of plants were concentric and shut into one another, led, as is well known, to the greatest improvement in the art of ship-building that this country has made." Such an improvement is certainly unknown to the public.

## IRON SHIPS.

The question has been frequently asked why it is that the Americans, who had obtained the lead of the whole world in the art of shipbuilding, have shown so little interest in the experiments which have been made in the use of iron in this art. It may be that the success of our shipbuilders had filled them with some of that conceit which is characteristic of the older nations, and they had got above learning anything from other people. If this is so, they have reaped the natural reward of their folly in the triumph which the English and Scotch have won over them by the adoption of a better material. It is gratifying to see that our people are at last beginning to arouse from their strange lethargy, though with a tardiness which is certainly not characteristic of them, and are beginning to adopt this great improvement. Commodore Vanderbilt has just had an iron steamer built, and two more are being rapidly finished in this city. One of these is the steamer *Alabama*, built by Samuel Sneeden, at Greenpoint, to run on Lake Ponchartrain. As the building of iron ships, now in its infancy, is destined to grow up with a rapidity probably unparalleled even in this country, we presume our readers will be interested in a plain account of the way in which they are made. We have, accordingly, obtained from Mr. Rowland, the engineer who superintended the building of the *Alabama*, a full description of the iron hull of that boat, which we present, illustrated by an engraving.

This boat is constructed in the same manner, substantially, as a steam boiler, with a single thickness of plates of iron riveted together where they lap at the edges. The structure is then braced lengthwise and crosswise in an exceedingly simple manner, which will be readily




IMPROVEMENTS IN IRON SHIPS.

understood by inspecting the engravings. Fig. 1 is a cross section of the hull, and Fig. 2 is a longitudinal section of a portion of the keelsons. Directly on the bottom of the vessel are placed the cross keelsons, 16 inches apart. The ends of these are shown in Fig. 2, A A A, and the side of one in A, Fig. 1. They are made of plates of iron 12 inches deep and 5-16 of an inch in thickness, set on their edges, strengthened at top and bottom with angle iron, and extending across the boat. The angle iron is 5-16 of an inch in thickness, and measures three inches on each side; that is to say, it is made of a bar or plate of iron six inches wide, bent at an angle in the middle. Five fore-and-aft keelsons, constructed in the same manner as the cross keelsons, only that they are strengthened with four rods of angle iron instead of two, run the whole length of the boat, standing on their edges on the top of the cross keelsons. Besides these, two box keelsons, C and C, 17 inches deep and 16 inches wide, made of plate 5-16 of an inch thick, and strengthened with bars of angle iron as shown in the cut, extend the whole length of the vessel on each side of the middle.

The plating is 5-16 of an inch in thickness, with the exception of the bent piece, D, which forms the keel, which is $\frac{1}{2}$; the garboard strake, E E, which is $\frac{1}{2}$; the bilge strake, F F, which is $\frac{3}{8}$; and the wales, G G, which are also $\frac{3}{8}$ of an inch thick. The side are strengthened with ribs of angle iron 16 inches apart, $3\frac{1}{2}$x$3\frac{1}{2}$ and $\frac{3}{8}$ of an inch thick, extending across the bottom at the angle of the cross keelsons, and firmly riveted to the outside plating and to the keelsons. Opposite the wales on the inside edge of the angle iron ribs, a clamp, H H, 20 inches deep and $\frac{3}{8}$ thick, extends around the vessel. On the top edge of this and the wales is placed a covering plate, I I, 13 inches wide and $\frac{3}{8}$ thick, also extending entirely around the boat, and strengthened with angle iron. The holes for the rivets in the plating are countersunk on the outside to receive the tapering rivet heads and make a smooth surface. To make the seams of the plating water-tight, after the riveting is done the edge is cut straight with a cold chisel, and is then upset with a blow on a blunt chisel or tool, in the same way that a steam boiler is finished. The stern, stern-posts and the rudder are all made of wrought-iron. Four water-tight bulkheads, made of $\frac{1}{4}$-inch plate and strengthened with $2\frac{1}{2}$x$2\frac{1}{2}$ angle iron, extend across the vessel.

The *Alabama* is 225 feet long, 32 feet beam, 10 feet depth of hold, and measures 630 tons. Her draft when launched was 28 inches. The increase in the cost above that of a wooden vessel was about 30 per cent, if reckoned on the hull alone; but this increase, if reckoned on the total cost of the vessel, amounts to only 10 per cent. Iron vessels are not coppered, but are simply painted with either red lead or zinc paint. They require painting about once a year. So far as we know, they may last hundreds of years. One was taken up in the Clyde, which had been to sea 10 years, and the statement was that she had never leaked a drop, and was as good as she was on the day she was launched. A ship made of iron is better in every respect than one made of wood; it is lighter, stronger, sharper, tighter and more durable.

A NEW STEAM BOILER.—Joseph Harrison, of Philadelphia, a Russian contractor, cotemporaneous with the Messrs. Winans of "cigar-steamer" notoriety, has recently constructed and put into operation a newly-devised steam boiler, which, for novelty and probable utility, equals the "ocean shuttle" of his Baltimore friends. It consists of 300 cast-iron globes, six inches in diameter, connected together by tubes two or three inches long. Though the projector alleges perfect safety from explosion and an actual saving of 300 pounds of coal per day for 25-horse power, it is difficult to conceive how thick cast-iron can generate steam faster than the thin copper tubing of a locomotive boiler, or how it is easier to keep the right quantity of water to prevent explosion in 300 bombshells than in a single boiler.—*New York Tribune.*

[Our cotemporary is perfectly right about the inferior conducting power of cast-iron in comparison with copper, or even with wrought-iron tubes, and we must also say this is not altogether a new steam boiler. It is similar in principle (though somewhat different in construction) to Franklin's "duplex steam generator," illustrated on page 192, Vol. VII., of the SCIENTIFIC AMERICAN.

## HOW TO MAKE HARD WATER SOFT.

One of our city subscribers—noticing in No. 12 of the present volume, SCIENTIFIC AMERICAN, an article on the above subject—called upon us and stated the fact that over 20 years ago a well was dug, 20 feet deep, on the Cottage Hill Farm, near Ravenna, Ohio, upon which he resided. It contained eight feet of water—after being stoned—the earth about which was blue clay, and the water was very hard. This serious defect was cured entirely, and the water softened permanently, by putting into the well four feet of gravel of the size of beans and upwards. He thinks this a sure remedy in all such cases, and wishes the fact made known through the SCIENTIFIC AMERICAN from Maine to California. If our informant's experiment was thoroughly made, and is correctly stated, no doubt the same results would be produced in all cases in which the essential circumstances are precisely the same, but we do not believe that his plan will render all hard water soft. When foreign substances are held in mechanical suspension in the water, a layer of gravel stones at the bottom may allow such substances to settle, but if the foreign matter is held in solution, the gravel could remove it only by getting into chemical combination with it, which would seldom occur.

## THE FOUR ORGANIC ELEMENTS.

### OXYGEN, HYDROGEN, NITROGEN AND CARBON.

### II.—HYDROGEN.

Hydrogen makes its most common appearance to us in flame. Whenever we see a blaze, there are many chances to one that there hydrogen and oxygen are entering into combination; in other words, that hydrogen is being oxydized or burned. There are a few exceptions: sulphur, phoshorus, and other volatile substances, as well as those gases which burn at all, burn with a blaze; but most of the flames that we see—the blaze of an oil-lamp, of a candle, of illuminating gas, of bituminous coal, of a wood fire, of nearly all fire—are, wholly or in part, the result of the combination of oxygen and hydrogen. In a blaze, the heat and light are all on the outside, as it is here alone that the burning gas can come in contact with the oxygen of the air. If we take a blow-pipe and blow the air through the flame, we set the whole body of the jet of gas on fire and increase the heat enormously. In the compound blow-pipe, pure oxygen gas is mixed with pure hydrogen gas as they issue from the pipe, in the proportion of eight ounces of oxygen to one ounce of hydrogen, and the most intense heat is produced which it is possible to produce by combustion.

Oxygen and hydrogen combine to form water in the proportion of one pound of hydrogen to eight pounds of oxygen; or more exactly, 1,000 lbs. of hydrogen to 8,013 lbs, of oxygen. Oxygen and hydrogen also form one other combination, in the proportion of 1,000 lbs. of hydrogen to 16,020 lbs. of oxygen. This compound is a sirupy liquid of a nauseous bitter taste, which does not become solid even in a very intense cold. Without the interposition of other substances it is impossible to make oxygen and hydrogen combine in any other proportions except these two. If we mix 8,013 ounces of oxygen with 1,000 ounces of hydrogen and touch the mixture with a spark of fire, the two gases combine with a flash and a report, forming water. There is so much heat developed that the water at first is expanded in vapor and is invisible, but it soon cools and condenses into the liquid form. If there is a single grain of either oxygen or hydrogen more than the proportion above stated, such surplus will not enter into the combination, but will remain separate and will retain the gaseous form. The other combination, which forms the sirupy liquid, is of just twice the quantity of oxygen to the same quantity of hydrogen.

Water may be decomposed by means of a galvanic battery, and the oxygen all carried into one jar and the hydrogen into another, when it is found that the oxygen, though eight times as heavy, occupies precisely half the bulk of the hydrogen.

## WEEKLY SUMMARY OF INVENTIONS.

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page.

### BUNGS AND SPIGOTS FOR LAGER-BIER AND OTHER LIQUOR CASKS.

John Keane, of New York City, has a good improvement in bungs or spigots for lager-bier and other casks, by which the liquor can be preserved in good condition, on draught, for a much longer time than when a common bung or spigot is used. The improvement consists in constructing a bung or spigot with a reservoir to be filled with spirits, and with a system of passages which causes all the air admitted to the cask to pass through the spirit and be impregnated with alcohol, thereby, in a great measure, preventing its injurious action on the liquor, which is thus kept good for a long time after the cask has been tapped. The patent is assigned to John Keane and Andrew McLean Wood.

### IMPROVED COTTON GIN.

The object of this invention is to obtain a cotton gin that will gin both the large and short staple cotton equally well without injuring the fiber, and with a rapidity equal to the ordinary saw gin. The invention consists in the employment or use of three or more firmly toothed or serrated cylinders, so arranged or disposed as to rotate nearly in contact with one another and form a cotton chamber or enclosure at their inner sides, the contiguous cylinders rotating in the same direction so that they will present, at the space between them, oppositely moving surfaces to the cotton, and by the action of said surfaces effectually separate the cotton from the seed. The invention also consists in using, in connection with the cylinders aforesaid, stripping brushes and a register; the former to strip the lint from the cylinders, and the latter to regulate the discharge of the seed from the cotton chamber. The inventor is John Wilson, of Anderson, S. C.

### IMPROVED STAVE MACHINE.

The object of this invention is to obtain a machine whereby staves for pails, tubs, &c., may be dressed, jointed, tongued and grooved at one operation, and with one and the same device. The invention consists in the employment or use of concave and convex rotating cutters, with a suitable bed-piece, tongueing and grooving cutters, and a pressure roller and cam, so combined and arranged for joint operation, that the staves may be dressed at both sides and perfectly finished, ready for immediate use as they leave the machine. The inventor is James Decker, of Reidsville, Ga.

### IMPROVED GAS-HOLDER FOR FERRY-BOATS, DWELLING-HOUSES, &c.

This invention is principally intended for use on a very small scale, as for receiving and conveying for the illumination of ferry boats or other vessels, or of other conveyances, gas which has been generated on shore or in stationary works, or for the reception of illuminating gas generated in dwelling-houses or other places where it is to be used. It consists in the construction of a gasometer, with its upper portion of conical form, having sides of india-rubber cloth, or other suitable material, combined with a head of stiff material, and of such size that it may be introverted within the lower tank-like portion, to expel the gas therefrom by pressure mechanically applied to its head. It is the invention of Jas. McFarlan, of Brooklyn, N. Y.

### IMPROVED TYPE-CASE.

This consists simply of a zinc plate, punched full of small holes about a quarter of an inch apart, to be substituted for the ordinary bottom of a type-case. The object is to allow the dust to rattle through and thus keep the case clean. We have had one in our printing-office two or three months, and think it a good improvement. Any one wishing further information on the subject, may address Hunter & Gilson, Bryan, Ohio.

## FOREIGN SUMMARY—METALS AND MARKETS.

The most astounding intelligence that we have received since our last issue is that of the explosion that occurred on board the *Great Eastern*, whereby eight engineers and firemen lost their lives, by scalding and inhaling the steam, and several others were severely injured. The disaster was caused by a defective water-heater, combined with great carelessness on the part of the engineer who had charge of the working of the engines at the time of the accident. The material damage consisted of one huge funnel or smoke-pipe, 40 feet high, being blown up vertically 30 feet, and thrown on the deck; the collapse of the funnel under the deck, together with an explosion of the iron casing of the funnel. The lower part of the funnel or smoke-pipe from the boiler to the deck was 40 feet high, 6 feet in diameter, and made of boiler-iron half an inch thick. Around this was a casing of the same hight and thickness of metal, with a space between the two about six inches wide, or a foot in diameter altogether. This space formed a huge annular water-heater, through which the water was pumped on its way to feed the boiler for the purpose of absorbing the waste heat from the smoke-pipe, and also to cool the space around on the outside. Owing to a defect in the working of the feed pump, its communication with the heater was shut off, so that the water was sent directly through another pipe to the boiler. As the water in the heater communicated with the boiler by a pipe at the top, of course it was filled with water, which was maintained at a heat at least equal to that of the steam in the boiler, namely, 283° Fah. A small pipe communicating with the heater, and rising above it 30 feet, had an opening in it to act as a safety valve, but it is said that a cock on this was closed, so that the safety opening could not act. As the water in the heater received continued heat from the smoke-pipe, without any cold water being fed in, the interior pipe of the funnel became very hot and collapsed, then the outside shell or heater casing pulled apart, and the water being 283° in temperature (or 71° above that of atmospheric pressure), as soon as it was relieved of the excess of 45 pounds pressure, it instantly flashed into steam of low pressure, and with its great expansive power it at once shot the heavy funnel weighing several tuns upwards, and also burst outwards circumferentially, destroying everything for a considerable space around. We describe this case with some minuteness, because it is a singular one, and goes to show how a small excess of pressure at first, sufficient merely to produce a rip or collapse, may lead to the instantaneous generation of a great body of steam and a great excess of pressure finally. It is stated that this heater was put on the funnel against the remonstrances of John Scott Russell, and was not applied to the funnel of the screw engines. Of this, however, we are not positive. No damage was done to the hull, machinery, or boilers; the engines never ceased working, but there was great consternation on board for some hours. The damages amount to about $25,000, and will be repaired by Mr. Russell in a few weeks. It is now reported that the *Great Eastern* will assuredly come to New York, as it is expected she will not draw over 25 feet water, and may thus pass over the bar at high tide. Her brief trip from the Thames to Portland, England, has most remarkably demonstrated the superior speed of this great vessel, and her steadiness in a heavy sea. With less than one-third of the usual speed of the engines, she made 12 knots per hour, and when large ships were pitching violently about, her great mass was scarcely moved by the waves. When the *Great Eastern* was commenced a few years ago, the SCIENTIFIC AMERICAN expressed the opinion that her motion would be comparatively easy on the sea; that the waves would have but little effect upon the hull, so as to cause sea-sickness among her passengers. The *Nautical Magazine* took this opinion up, and pronounced it erroneous. Of course, it will require a voyage across the Atlantic to test fully the correctness of this opinion; thus far, however, it seems to have proved reliable.

The *Scotia*, a new paddle-ship to be built for the Cunard Company at Glasgow, has been designed for a considerable period; but, with Scotch, caution her proprietors and engineers have waited to see what new engineering facts might be developed in the construction of the *Great Eastern*. All the working-drawings are now prepared, and the construction of this ship will proceed with all the dispatch possible, and it is asserted that it will not be surpassed for speed by any steamer whatever.

The builders' strike in London appears to be drawing to a close, the operatives having been reduced to a very low state for want of funds; still they have mostly refused to sign the conditions given them by the master-builders, namely, to repudiate all connection with the Trades' Societies. The London *Mechanics' Magazine*, which has denounced strikes as injudicious and injurious, says that these operatives are more deserving of sympathy than those men who have acquired accumulated capital by means of the toil of the artisan, and who have seemed to glory in seeing their workmen starved, so that they might be vanquished.

The trade at Sheffield is in a very prosperous condition; the demand for crinoline steel is very great, and much of it is for the American market. "New York belles cut a swell which throws the portly dimensions of lusty English ladies far into the background." So says Charlie Mackay in his "Notes on America," just published.

We omit our usual table of the English metal market, because the change in prices is so little varied from last week that we have occupied the space with more than the usual amount of other foreign matters.

### New York Markets.

COAL.—Anthracite, from $4.50, to $4.75 a $5.

COPPER.—Lake Superior ingots at 29c. per lb for cash; new sheathing, 26c.

COTTON.—Ordinary—Uplands, 9c. per lb.; Florida, 9c.; Mobile, 9c.; New Orleans and Texas, 9½c. Middling—Uplands and Florida, 11⅝c.; Mobile, 11¾c.; N. O. and Texas, 12c. Middling fair—Uplands and Florida, 12⅛c.; Mobile, N. O. and Texas, 13c. Fair—Uplands and Florida, 12⅝c.; Mobile, 13¼c.; N. O. and Texas, 14c.

FLOUR.—State, superfine brands, $4.60 a $4.75; Superfine Western, $4.75 a $4.75; Extra Illinois, Indiana and Michigan, $4.85 a $5.35; Extra Ohio, $5.05 a $6.75; Extra Genesee, $5.50 a $7.25; Inferior to Choice Missouri, $5.25 a $8.50; Extra Kentucky and Tennessee, $5.40 a $9.

GLASS.—American Window—First, second, third and fourth qualities, per 50 feet: 6 by 8 to 8 by 10, $3.50 a $3.75; 8 by 11 to 10 by 15 $4 a $3; 10 by 16 to 12 by 18, $4.50 a $5.25; 12 by 19 to 16 by 24, $5.25 a $5.50; 16 by 25 to 20 by 30, $6 a $4; 20 by 31 to 24 by 36, $8 a $4.50; 25 by 36 to 30 by 44, $9 a $5. These prices are subject to a large discount.

HEMP.—American undressed, $140 a $150; dressed from $190 a

$310. Jute, $95 a $99. Italian, $2.75. Russian clean, $310 a $315 Manilla 6¾c. per lb.

INDIA-RUBBER.—Para, fine, 55c. a 60c. per lb.; East India, 40c. a 42c.

INDIGO.—Bengal, $1 a $1.50 per lb.; Manilla, good to prime, 55c. a $1.10; Guatemala, $1 a $1.15.

IRON.—Anthracite pig, $23 a $24 per ton; Scotch, $22.50 to $23; Swedish bar, ordinary sizes, $87.50 a $90; English refined, $53 a $54; English common, $43 a $45; Russian sheet, first quality, 11c. a 12c. per lb.; English, single, double and treble, 3¾c. a 3¾c.

LEAD.—Galena, $5.75 per 100 lbs.; German and English refined, $5.70; bar, sheet and pipe, from 6c. to 6¾c.

LEATHER.—Oak slaughter, light, 32c. a 25c. per lb.; Oak, middle, 33c. a 35c.; Oak, heavy, 32c. a 34c.; Oak, crop, 37c. a 40c.; Hemlock, middle, California, 23c. a 23¾c.; Hemlock, light, California, 23¾c. a 23c.; Hemlock, heavy, California, 21¾c. a 22c.; Hemlock, heavy, 20c. a 21c. Patent enameled, 16c. a 17c. per foot, light. Sheep, morocco finish, $7.50 a $8.50 per dozen. Calf-skins, oak, 57c. a 60c.; Hemlock, 56c. a 60c.; Belting, oak, 32c. a 34c.; Hemlock, 28c. a 31c.

LUMBER.—Timber, white pine, per M feet, $17.50; Timber, yellow pine, $35 a $36; Timber, oak, $18 a $28; Timber, eastern pine and spruce, $17.50; White Pine, select, $25 a $30; White Pine, box, $14 a $18; White Pine, flooring, 1¼ inch, dressed, tongued and grooved, $34.50 a $35; Yellow Pine, flooring, 1¼ inch, dressed, tongued and grooved, $29 a 29; White Pine, Albany boards, dressed, tongued and grooved, $29 a $31; Black Walnut, good, $45; Cherry, good, $45; White Wood, cherry plank, $42; Spruce Flooring, 1¼ inch, dressed, tongued and grooved, each, 22c.a24c.; Spruce Boards, 15c. a 17c.; Hemlock Boards, 12½c. a 14c.; Hemlock Joist, 3 by 4 inch, 12½c. a 14c.; Shingles, cedar, per M, $28 a $35; Shingles, cypress, $12 a $25; Staves, W. O. pipe, light, $55 a $58; Staves, white oak, pipe, heavy, $75 a $80; Staves, white oak, bbl. culls, $20; Heading, white oak, hhds., $65.

NAILS.—Cut at 3c. a 3½c. per lb. American clinch sell in lots, as wanted, at 5c. a 6c.; wrought foreign, 3¾c. a 3½c.; American horse-shoe, 14¼c.

OILS.—Linseed, city made, 58c. per gallon; whale, bleached spring, 55c. a 56c.; sperm, crude, $1.25 a $1.28; sperm, unbleached spring, $1.35; lard oil, No. 1 winter, 87c. a 92c.; extra refined rosin, 30c. a 40c.; machinery, 50c. a 100c.; camphene, 45c. a 47c.; coal, refined, from $1.12 a $1.50; olive, $1 a $1.05.

RESIN.—Common, $1.60 per 310 lbs. bbl.; No. 2, &c., $1.70 a $2; No. 1, per 280 lbs. bbl., $2.25 a $3; white, $3.25 a $4.50; pale, $5.50.

SPELTER plates, 5¾c. a 5¼c. per lb.

STEEL.—English cast, 14c. a 16c. per lb.; German, 7c. a 10c.; American spring, 5c. a 5¼c.; American blister, 4¼c. a 5¼c.

TALLOW.—American prime, 10¼c. to 10¾c. per lb.

TIN.—Banca, 32¼c. a 33c.; Straits, 30¾c.; plates, $7.50 a $9.25 per box.

TURPENTINE.—Crude, $3.62½ per 280 lbs.; spirits, turpentine, 46c. per gallon.

ZINC.—Sheets, 7¼c. a 7¾c. per lb.

The foregoing rates indicate the state of the New York markets up to September 29th.

There is but little difference in the prices of this week from those of the last. Cotton has been inquired after moderately, and prices are favorable for purchasers. The sales of flour have improved, the demand for southern being quite lively.

Crude turpentine has been more sought after. This business is of immense importance to our country, as we supply not only ourselves, but England, with this useful article; also with the residuum of distillation (resin) which is so much employed in soap-making, and in the manufacture of varnishes. The following is the quantity of turpentine and resin which has come into New York since January 1, up to the 27th ult:

| | Receipts. | Exports. |
|---|---|---|
| Crude turpentine, bbls..... | 75,484 | 71,331 |
| Spirits turpentine, bbls..... | 108,883 | 53,594 |
| Resin ..... | 554,125 | 446,282 |

The demand for crude sperm oil has been more active. Since January 1st up to the 26th ult., 75,598 barrels of sperm have come into the city, and 188,579 barrels of whale oil, also 1,774,900 lbs. of whalebone.

The wool trade has been good for the week past. Domestic grades have been much sought after by manufacturers, and holders appeared not too anxious to sell. These are good signs for our manufacturing interests. The receipts of domestic for the week were 2,805 bales, of which no less than 1,798 were from San Francisco, which appears to be a great wool country; the sheep being more prolific than in any other portion of our continent. The prices have ranged from 33 to 55 cents per pound, and some selected lots as high as 60 to 62. The California fleeces ranged from 20 cents, unwashed, to 35 cents. Texas is also becoming a great wool-raising country. In Boston the price of wool has advanced one cent per pound on the better qualities. The late news from Europe are favorable for an advance on wool, and probably this has somewhat stimulated our markets.

CALIFORNIA.—We learn from our San Francisco exchanges that good California flour is selling at from $6 to $8 per barrel; Collins' axes, at $12.50 to $13 per dozen; cut nails, at 4 cents per pound; Yankee painted pails (three hoops), at $2.37½ per dozen; Scotch and American pig iron, at $32 per tun; Banca tin, at 38 to 40 cents per pound; Copper, at 28 cents per pound.


ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING SEPTEMBER 27, 1859.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

### 25,553.—Abel Austin, of Altona, Ill., for an Improved Churn:

I claim the arrangement of the shaft, a, cranks, a a' a'', dashers, D E F, handles, D' e e, links, b b b, springs, c c c, box, 1 i, spring, g, and lid, F F', together, the same being connected, combined and constructed, substantially as and for the purpose described.

### 25,554.—William B. Barnard and Edmund Jordan, of Waterbury, Conn., for an Improved Rotary Blower:

We claim the diaphragm, I, in combination with the revolving propeller or propellers, k, to deflect the blast to the mouth or opening, f, as the blower revolves in the case, c, substantially as set forth.

### 25,555.—Elbridge G. Belknap, of Philadelphia, Pa., for an Improved Camp Stool:

I claim the combination of the case and the seat frame with the swivel blocks, braces and connecting-rod, the whole being arranged substantially in the manner specified and described.

### 25,556.—Lewis Reese Carpenter, of Lancaster, Ohio, for an Improvement in Seed-planters:

I claim the arrangement of the beam, A, handles, C C, braces, D D, furrowing scraper, E, and seed-box, F, with the planting slide, H, lever, N, wheel, S, and covering scrapers, L L, the whole being constructed for joint operation as described, for the purpose set forth.

### 25,557.—Edwin S. Collin and Thos. N. Read, of Aspen Wall, Va., for an Improvement in Machines for Preparing Tobacco for Pressing:

We claim the arrangement of two, three or more pairs of progressive pressure-rollers with each other, substantially in the manner and for the purpose set forth.

We also claim combining a series of oil vessels and oiling pads with the aforesaid pairs of pressure-rollers, substantially in the manner set forth.

### 25,558.—John Critcherson and Eri S. Moulton, of Boston, Mass., for Improvement in Machines for Splitting Welts:

We claim the beveled grooves, n and x, constructed and arranged in reference to each other, on the cylinders, C and D, and operating in combination with the adjustable cutter, H, substantially as set forth and for the purposes described.

### 25,559.—Tobias Crumling, of Hellam, Pa., for an Improvement in Harvesters:

I claim the arrangement and combination, as shown and described, of the independent platform, K, with the frame, L', belt, M', and driving axle, C, for the purpose set forth.

[This invention relates to an improved grain and grass harvester, and consists in a novel arrangement of the main frame, cutting device, platforms and a rake, whereby the desired work may be done in a very efficient manner, the machine working equally well either in the capacity of a reaper or mower.]

### 25,560.—Geo. S. Curtis, of Chicago, Ill., for an Improvement in Reels for Harvesters:

I claim the employment of sliding boards, B, and pivoted arms, C, and bars, F, in combination with the reel shaft, A, and beaters, D, substantially as shown and described, so that the diameter of the reel can be expanded or contracted, as and for the purpose set forth.

[This invention consists in constructing the reel in such a manner that it will admit of being folded or closed in a compact state when not required for use or in case of transportation, and also admit of being readily unfolded and adjusted firmly on its shaft, so as to be of greater or less diameter, as may be required, when applied to the harvester to perform its legitimate work.]

### 25,561.—Jacob D. Custer, of Norristown, Pa., for an Improvement in Harvesters:

I claim, first, The main shoe, A A A, constructed in the manner described, in combination with bars, J J, of main frame and supporting-bar, T, arranged and operating in the manner described for the purpose specified.

Second, The caster wheel, I, in combination with the lever, M, and adjustable plate, N, when the parts are constructed, arranged and operated in the manner described for the purpose specified, substantially as set forth.

### 25,562.—J. S. Davison, of Cranberry, N. J., for an Improved Telegraphic Cable:

I claim arranging a series of loose metal strips, a, in a coil, A, or its equivalent, substantially as and for the purpose described.

[Telegraph cables, especially for deep water, ought to be so constructed that the conductor is not affected by any strain to which the cable may be subjected. This object is fully obtained in Davison's cable, the conductor of which consists of a series of loose strips of copper wire, hooked or otherwise united to a coil which forms a part of the protection of the conductor, so that, by stretching the cable, the circuit remains unbroken.]

### 25,563.—Eben Eaton, of Cincinnati, Ohio, for an Improved Bedstead:

I claim the construction of bed-posts with the wedge-formed part and the square piece attached, so as to form a shoulder to receive the rail, in combination with the bottom or platform of a bedstead, with the rail formed so as to fit the posts described, and all permanently connected together by means of cross-pieces, substantially as specified.

### 25,564.—G. D. Foote, of Danbury, Conn., for an Improvement in the Mode of Coloring Woolen Hats:

I claim the described process of restoring the color of the hats after they have been dipped in the stiffening and rubbed off with sand paper by applying the hot dyeing liquid, substantially in the manner specified.

[The object of this invention is fully expressed by the claim. By dipping the hats in the stiffening, and when they are rubbed with sand paper, their color changes. It is therefore of great importance to restore the color by a simple process, which furthermore gives a better appearance to the hats.]

### 25,565.—John Fritz and Geo. Fritz, of Johnstown, Pa., for an Improvement in Rolling Mills:

We claim the application to each of the pairs of drawing or forming rolls of a feed roll such as described, and driven by gearing or other machinery, and turning in the same direction with said drawing or forming rolls, for the purpose of carrying and feeding into them the pile or bar of heavy iron, substantially as described.

### 25,566.—Harvey Guild, of New Orleans, La., for an Improvement in Apparatus for Washing Gas:

I claim the arrangement of the water-pipe, G, and rose, H, within the inlet pipe of the wash-box, A, in combination with the perforated plate or diaphragm, F, at the junction of the inlet pipe, with the wash-box, substantially as described.

[This invention consists in a certain arrangement of a water-pipe and rose within the inlet pipe of a gas-condenser, in combination with a perforated plate at the junction of the inlet pipe of the wash-box, whereby the gas is brought into very intimate contact with showers of water and caused to pass through small holes along with the water, and the gas is caused to be presented to the action of very extensive and constantly-changing surfaces of water, and very perfectly washed and purified.]

### 25,567.—N. E. Hale, of Nashua, N. H., for Improved Belt-hook, Pliers and Punch:

I claim, first, The combinationation of the roughened surfaces, O and H, with the triangular wedge end, G, arranged in relation to each other, substantially as and for the purposes set forth.

Second, The combination of the jaws, E F, with the punch, J, roughened surfaces, O H, and wedge end, G, the whole being constructed and arranged as and for the purposes set forth.

### 25,568.—John Howarth, of Salem, Mass., for an Improvement in the Method of Distilling Oil from Coal:

I claim forming oleaginous vapors from coal or other substances yielding pyrogenous oils, by passing, through the material to be acted upon, a current of superheated steam, in combination with steam direct from the boiler, substantially in the manner and for the purpases set forth.

I also claim forming oleaginous vapors from coal or other substances yieiding pyrogenous oils, by passing through the material to be acted upon air combined with superheated steam, substantially in the manner and for the purposes set forth.

### 25,569.—Tyler Howe, of Cambridgeport, Mass., for an Improved Bedstead Slats:

I claim the described bed slat, consisting essentially of the lifter, A, in combination with the slat, constructed and operating in the manner substantially as set forth.

Also the construction in the ends of slats, by which they are connected with the bedstead or springs, as shown by C and D, and as described.

### 25,570.—Edward C. Knight, of Philadelphia, Pa., for an Improved Mode of Arranging Couches in Railroad Cars:

I claim the arrangement of couches in railroad cars by means of the double-hinged rod, C C, constructed as described, in such a manner that the couch, when not in use, may be folded up against the ceiling and retained there by means of a button or other suitable device, substantially as described.

### 25,571.—W. Kuhlenschmidt, of New York City, for an Improved Screw-wrench:

I claim the arrangement and combination of the conical disk, E, with the helical groove, c, the spring, d, the movable jaw, C, and the shank, B, to operate substantially as and for the purpose set forth.

### 25,572.—James Allen Lowe, of New York City, for an Improvement in Molding Water-traps:

I claim the application of a metallic core, constructed and operating substantially as described, to cast water-traps.

### 25,573.—James L. Meafoy, of Middleton, N. Y., for an Improvement in Cooking-stoves:

I claim the cylindrical fire-chamber, F, air-chamber, G, communicating with the fire-chamber and the heater-chamber, I, when combined and arranged relatively with each other and the oven, B, for the purpose set forth.

I also claim, in combination with the fire-chamber, F, air-chamber, G, and heater-chamber, I, arranged as shown, the perforated plate, K, placed in the flue, C, relatively with the fire-chamber, for the purpose set forth.

[The object of this invention is to economize in the consumption of fuel by a very simple arrangement of means, and at the same time render the stove more convenient and desirable for general use than all others that have passed under our observation. The invention consists in having the fire-chamber of cylindrical form placed in the front part of the stove and encompassed by an air-chamber communicating with the upper part of the fire-chamber by small orifices, and having a water-heater adjoining the air-chamber, the above parts being placed directly in front of the oven and also used in connection with a perforated and equalizing draught plate, whereby the desired end is attained.]

### 25,574.—Z. N. Morrel, of Cameron, Texas, for an Improvement in Machines for Distributing Fertilizers:

I claim the combined arrangement of the single side wheel, D, distributing-wheel, C, regulating-slide, I, revolving-arms, L, boot, K, set screw, J, shares, d d, cog-wheels, E1 E2, draft-rod, S, sprocket-wheels, F1 F2, roller, H, and chain, G, in the manner and for the purposes set forth.

### 25,575.—George Mowbray, of Green Point, N. Y., for an Improvement in Process of Distilling Oils from Coke:

In the manufacture of coal-oils and other pyrogenous oils, by exposing the coal, or other materials, to the products of combustion generated in a separate furnace, I claim igniting said products of combustion, previous to admitting the same into the distilling kiln, by admixture of a sufficient proportion of air, to burn the oxyd of carbon into carbonic acid, substantially as described and for the purposes set forth.

### 25,576.—Geo. Munger, of New Haven, Conn., for an Improved Writing-tablet:

I claim a new article of manufacture, to wit, an argillaceous surfaced wood writing-slate, which is formed by uniting several layers of veneering or thin wood together, so that their grains run antagonistic to one another, and then coating the exterior surfaces of the compact mass with a composition of slate, emery, or other similar argillaceous material, substantially as and for the purposes set forth.

### 25,577.—S. D. Newbro', of Lansing, Mich., for an Improved Bed-spring:

I claim the employment of the oblong plates, a a a, whether made of wood or of metal, or any other suitable material, when the same are secured together, substantially as and for the purpose set forth.

### 25,578.—Rufus Nutting, of Randolph, Vt., for Improved Manufacture of Wire Cloth:

I claim compressing wire cloth by passing it between rollers, suitably constructed, or by equivalent means, whereby its surfaces are rendered smooth and even, in the manner and for the purposes substantially as specified.

25,579.—Oscar Paddock, of Watertown, N. Y., for an Improvement in Stoves:

I claim the damper, c, arranged over the pipe, b, through which a direct communication between the fireplace and the chimney is effected and operated by means of a rod, k, or its equivalent, which is secured to the door, B, and which acts against a forked lever, g, substantially as and for the purpose specified.

[When the room of a stove is opened, the smoke from the interior of the same rushes out and fills the room. To prevent this, and to provide an escape for the smoke to the chimney whenever the door is opened, is the object of this invention, which consists in arranging in a pipe that leads from the front part of the stove to the chimney, a damper or valve which connects with the furnace door in such a manner, that whenever the door is opened said valve is also opened, and a direct communication between the fire-place and the chimney is effected.]

25,580.—Andrew Patterson, of Birmingham, Pa., for an Improvement in the Manufacture of Hoes:

I claim the improvement in the manufacture of hoes, substantially as described, viz., forming the head or eye of a hoe, and attaching it to the blade at the same time by pouring the molten metal to form the head on or around the blade, substantially as described and set forth.

25,581.—Edward L. Perkins, of Roxbury, Mass., for an Improved Construction of Packing-boxes:

I claim, first, forming the sides, ends, bottom and top of the box with, or attaching thereto, the right angular-shaped braces or shoulders, g g, &c., formed with beveled corners, so as to make a close and binding joint, as described.

Second, In combination with the above, I claim the the cover formed in two wedge-shaped pieces, or in any manner substantially similar, whereby all the parts constituting the box are drawn and held rigidly together, as set forth.

25,582.—Jane Phillips, of New York City, for an Improvement in Muffs:

I claim a muff, A, arranged with a cut, b, in its side covering or shell, an annular space or pocket, a, and a porte-monnaie, D, secured in its inner part, the whole constructed in the manner and for the purpose specified.

[The object of this invention is to make a muff serve not only as a cover to keep the hands warm, but also as a receptacle for such articles which it is desirable to have in convenient reach, and it consists in arranging a muff with its outside covering or shell cut open so as to give access to the space between said shell and the interior patr of the muff. In this space the handkerchief and other articles may be kept. There is also a porte-monnaie secured between the lining, and thus rendered perfectly safe and secure from loss.]

25,583.—Joseph F. Pond, of Cleveland, Ohio, for an Improvement in the Hoops of Skeleton Skirts:

I claim the combination of the eye, e, on one extremity of the hoop, with the series of set-offs, a, on the other, constructed and operated substantially as set forth.

25,584.—C. W. Pyle, of Galveston, Texas, for an Improvement in Securing Iron Bands on Cotton Bales:

I claim a plate constructed with a short open slot, a, a long closed slot, and a turned down lip or flange, substantially as described and for the purpose specified.

25,585.—Cornelius J. Rooney and David Renshaw, of New York City, for an Improved Spring Hinge:

We claim the arrangement of the coiled spring, E, shaft, C, and wings, A and B, in combination with each other, as described, for the purposes stated, when the parts are constructed substantially as set forth.

25,586.—Abbott Q. Ross, of Cincinnati, Ohio, for an Improvement in Burglar's Alarm:

I claim connecting the doors or windows of a house to an alarm mechanism, through a system of strained wires, so that the forcing of a door, or the cutting of any wire shall let off the alarm mechanism, substantially as described.

I also claim so connecting the panels of a door with the strained wires that unite the door with the alarm mechanism, as that the cutting out of a panel, or the cutting of one of the wires shall let off the alarm mechanism, substantially as described.

I also claim the combination of the swinging lever, t, on the door, with the bolt, r, and its inclined plane, s, that locks the spring drum, J, for the purpose of putting said door in connection with the alarm mechanism, when said door is drawn to, and shut from the outside, substantially as set forth.

25,587.—John Rouse, of Port Gibson, N. Y., for an Improvement in Horse Harnesses:

I clarm the duoble-eyed hook, D, arranged as described in the yoke ring, C, so as not to be withdrawn therefrom, in combination with said ring and with the divided hame straps, E E', which are respectively secured to the opposite eyes of the hook, for the purposes specified.

25,588.—John Sparrow, of Portland, Maine, for an Improved Steam Punching-machine:

I claim the employment, for the purpose specified, of a single-acting cylinder and piston, operated by the pressure of steam, water, or other fluid, and a toggle, combined with and arranged and applied relatively to each other and the punch or cutter, substantially as described.

[This is a very simple, powerful, and convenient machine for the purposes for which it is intended. The invention takes advantage of the great force due to the pressure of steam or water on a large piston, and combines it with that powerful device, the toggle.]

25,589.—Peter M. Satzell, of Philadelphia, Pa., for an Improved Method of Operating Independent Second Hands of Stop Watches:

I claim, first, the independent second hand, M, adapted to a watch substantially in the manner described, so that by means of the devices described, or their equivalents, the said hand may be connected to or disconnected from the time train of the watch, without interfering with the movements of the latter, for the purposes specified.

Second, The stop arm, N, with its forked end so adapted to the hollow arbor, L, as to serve the purpose of stopping and releasing the said arbor, and at the same time serving to maintain it in its proper vertical position.

Third, The wheel, P, with the springs, f f, in combination with the hollow arbor, L, of the independent seconds hand; the wheel being hung loosely to, and the spring bearing against the said arbor, as and for the purpose set forth.

25,590.—Wm. J. Stetson, of Baltimore, Md., for an Improved Safety Envelope:

I claim the mode of giving security to letter and other envelopes, substantially as set forth, the same consisting in water-proofing that part of the envelope upon which the adhesive material is applied.

25,591.—John Stevens, and John Johnson, of New York City, for an Improvement in the Construction of Gas-burners:

We claim the apertures, B B', in combination with the movable slide, C, or its equivalent, substantially as described, whereby the area of the passage for the gas or vapor is contracted at pleasure, at the point of its exit into the atmosphere, and the volume of the flame diminished, without substantially changing its character.

We also claim the arrangement of the branches, B B', diverging from a single pipe, A, and pressing by their elasticity against the opposite side of the slide, C, for the purposes explained.

25,592.—J. C. Stoddard, of Worcester, Mass., for an Improved Chamber Utensil:

I claim a chamber vessel provided with a flange, c, and elastic ring, b, made as shown and described, so as to form a tight joint, and also to prevent noise, as set forth.

[The utility of this invention will be understood from the claim, and requires no further description.]

25,593.—Joseph N. Treadwell, of Redding, Conn., for an Improvement in Machines for Scouring and Hulling Buckwheat:

I claim the arrangement of the revolving and graduated screws with the hoppers, conveyors, blasts, and conductors, in the manner and for the purpose described.

25,594.—Richard Ward, of Edinburg, Ind., for an Improvement in Smut Machines:

I claim the employment of the corrugated iron plate, C, having the horse-shoe perforations, c, in combination with the iron plate, D, having the diamond perforaions, b, in the construction of a perforated scouring and separating cylinder, B, all being arranged to operate substantially as and for the purposes set forth.

25,595.—S. J. Wasterburg, of Altona, Ill., for an Improvement in Seed-planters:

I claim the arrangement of the block, A, provieed with chambers, C, and chambers, B, with the rods, D, shaft, a, handle, F, hopper, H, spring, i, slides, E, and spring, G, substantially as and for the purpose set forth.

25,596.—C. L. Whitney and Samuel Reed, of Geneseo, Ill., for an Improvement in Stoves:

We claim the arrangement of deflecting plate, F, chamber, C, graduating damper, J, and flue-pipes, H H, in the four corners of the oven, all in combination for the purposes set forth.

Second, In combination with this, we claim the use of pipes of clay, or other similar material, when the same are arranged in the manner and for the purposes set forth.

[This invention consists in a novel arrangement of flues and flue-spaces, so that the hot air is carried from the fire-chamber under a dfiecting plate, and passed up through pipes arranged on each side of the front of the oven, and over the oven and down through similar pipes, arranged in rear of the oven, and thence out to the smoke-pipe; and the manner of attaining a regular increase of draft in its passage through the stove. It also consists in the arranging of pipes of clay or other similar substance, within the oven and between the flue-pipes, in order to absorb and retain the heat, and give it out slowly into the oven during the operation of baking.]

24,597.—A. B. Weaver, of Carthage, Ind., for an Improved Abdominal Supporter:

I claim the employment of the hip bands, F F, and center hip straps 1 1, in combination with the straps, A A', arranged substantially as and for the purposes set forth.

25,598.—Zatter F. Wilder, of Painted Post, N. Y., for an Improvement in the Method of Raising Water by Animal Power:

I claim the arrangement of a series of platforms in combination with a pump, so that a series of strokes of the pump piston shall be produced before the cattle arrive at the drinking trough, substantially as and for the purposes set forth.

25,599.—Reuben Wood, of Grand Ledge, Mich., for an Improved Hand Punch:

I claim, first, The peculiar relative arrangement of the two series of inclined planes, in the contact faces of the circular plates, C1 C2 C3, to be used either with or without interposed balls or rollers, in the manner and for the purposes substantially as specified.

Second, I claim the use of the slotted tube, I, in combination with the two inclined ways, P P, and cross bar, J, (with or without the rollers, R R,) constructed and arranged substantially as described, for the purpose of extricating and lifting a punch, or other tool, in the bar, F, by a reversed motion of the lever.

25,600.—John Wilson, of Anderson C. H., S. C., for an Improvement in Cotton Gins·

I claim, first, The employment of three or more toothed or serrated cylinders, D, arranged and disposed so as to operate substantially as set forth.

Second, In connection with the cylinders, D, thus arranged and disposed, the rotating stripping brushes, M, and adjustable plug or register, P, to ensure respectively the proper discharge of the lint and the seed.

25,601.—Henry W. Wimshurst, of Dalton, England, for an Improved Manufacture of Sheet Metal:

I claim the improvement herein described in the manufacture or production of sheet metal, or metal foil, as an article of manufacture and trade, by cutting the same from a block or solid mass, by means of a cutting-mechanism, in lieu of rolling or beating the same by means of rolling or beating-mechanism, as has heretofore been done.

25,602.—O. D. Barrett (assignor to himself and J. F. Keeler) of Cleveland, Ohio, for an Improved Door Spring:

I claim the levers, D and E, in combination with the connecting-rod, F, and the springs, H H, constructed and operated as specified.

25,603.—James Decker (assignor to himself and A. P. McRae,) of Reidsville, Ga., for an Improved Stave Machine:

I claim the combination and arrangement of the convex and concave cutters, a, f, bed-piece, C, tonguing and grooving cutters in the heads, L L', and the cam, H, attached to the pressure hub or roller, G, and lever, N, connected with the said cam, and the shaft, K', of cutter head, L', substantially as and for the purposes set forth.

25,604.—Francis Dixon, of Lynn, Mass. (assignor to himself and Moses Sweetzer, of Newburyport, Mass.) for an Improvement in the Manufacture of Cigar-wrappers:

I claim a new article of manufacture for the special purpose set forth; the same consisting of tobacco leaf reduced to pulp, and converted subsequently into sheets, or other desirable form suitable for use, or in the making of cigar-wrappers, as explained.

25,605.—Luther Hall (assignor to himself and S. S. Hemenway, of Boston, Mass.) for an Improved Machine for Shaping Heels for Boots and Shoes,

I claim the combination of the stationary bed-plate, A, the movable cutter-carriage, D, provided with self-adjusting cutters, O P, and carriers, J, K, adjustable clamps S, T, a guide friction-wheel, N, and a curved rack and pinion; the whole being arranged and made to operate substantially as and for the purposes set forth.

I also claim combining with the adjustable clamps, S, T, constructed as described, an adjustable holder and former, Y, so constructed and arranged as not only to co-operate with the clamp in maintaining the heel of the boot or shoe firmly in position, but to serve as a pattern, to give the heel any desirable contour on its bearing surface.

I also claim the peculiar construction of the secondary cutter-carriage set forth, and the arrangement of the secondary cutter with respect to the primary cutter, the guide friction-wheel, and the heel-tread former, Y, whereby the secondary cutter is rendered capable of giving to the lower or bearing surface of the heel any form that may be desired.

25,606.—John Keane (assignor to himself and Andrew McLean Wood), of New York City, for an Improvement in Bungs of Casks:

I claim providing a bung, or spigot, with reservoir for spirit, and a system of pipes or passages, a b, or their equivalent, so arranged as to cause all the air entering the cask to pass through the spirit in said reservoir, substantially as and for the the purpose specified.

And in combination with such a reservoir, and system of pipes and passages, or their equivalents, I claim a valve, c, applied to the bung or spigot, substantially as and for the purpose specified.

25,607.—James McFarlan (assignor to James McFarlan, Jr., and E. McFarlan), of Brooklyn, N. Y., for an proved Portable Gas-holder:

I claim the construction of the gasometer, with its upper portion, B C, of conical form, with flexible sides, and with a stiff head, and of such size that it may be introverted, substantially as described, within the stationary tank-like portion, A, to which its flexible sides are attached.

25,608.—Jefferson Nash, of Janesville, Wis., assignor to himself and Alonzo K. Cutts, of Fulton, Wis., for an Improvement in Grain Separators:

I claim the arrangement and combination of the vibrating lever, E, the elbow-crank, f, and the rods, c and h, whereby the motion of the shoe can be changed from a longitudinal to a transverse direction, and vice versa, substantially as described.

[This invention consists in a particular arrangement of a vibrating lever, an elbow-crank and rods extending from the arms of said crank to the shoe, so that a longitudinal or a transverse shake can be given to the shoe at pleasure.]

25,609.—August Schmidt (assignor to himself, Charles Schmidt, Edward Schmidt, and Herman Schmidt, of New York City, for an Improved Apparatus for Making Gas from Wood:

I claim the arrangement of the arch-shaped retort, a, and narrow flues, g' g', with the arch of the retort, in the manner and for the purposes substantially as specified.

25,610.—August Schmidt (assignor to himself and Chas. Schmidt, Edward Schmidt, and Herman Schmidt), of New York City, for an Improvement in Apparatus for Making Gas from Rosin:

I claim the retorts, c, and its flues, e e, combined with the receptacle or kettle, g, and arranged in the manner and for the purposes specified.

25,611.—Geo. Hand Smith (assignor to S. O. Smith), of Rochester, N. Y., for an Improved Apparatus for the Production of Hare's Hydro-Oxygen Light:

I claim, first, The use of carbureted hydrogen gas, in combination with the atmospheric air, or oxygen gas, in proportions desired, operating under condensation through a proper regulator, and discharging through jets of minute orifice upon and rendering incandescent any proper radiating material, of any form, being independent of any atmospheric circumstances or situation, in the manner and through the means and machinery substantially as described.

Second, The arrangement of four jets or burners for directing the impact of gases or incandescent surfaces, such burners having minute orifices pointing to a common center, three of them placed so that their orifices of discharge shall be within or nearly within one quarter of the circumference of a circle drawn through them from the center to which they point (being not more than one-eighth of such circumference distant from each other), and the orifice of the fourth being diametrically opposite in such circle to the middle orifice of the other, thus substantially as described.

RE-ISSUES.

Elliot Savage, of Berlin, Conn., assignor to himself and Chas. Parker, of Meriden, Conn., for an Improvement in Machines for Threading Screw Blanks. Patented Nov. 21, 1854:

I claim the method described of causing the chasing tool to act upon the screw blank in producing both the cylindrical part, and the tapering point, that is to say, by so govering the relative positions of each to the other, that while threading the cylindrical portion the chasing-tool shall be presented at a right angle to the axis of rotation of the blank, and while cutting the tapering part shall be so inclined acutely to said axis that the line of trawel of the face of the chaser shall finally intersect said axis, substantially as set forth.

Elliot Savage, of Berlin, Conn, assignor to himself and Charles Parker, of Meriden, Conn., for an Improvement in Machines for Threading Screw Blanks. Patented Nov. 21, 1854:

I claim, as an improved article of manufacture, a wood screw, of which the entering end is made to taper in the manner and for the purposes substantially as set forth, that is to say, by giving to the core thereof a form bounded in any plane which passes through the axis of rotation, by lines which converge toward, and if produced, will intersect said axis, in contradistinction to the known form wherein the bounding lines in such planes are parallel to said axis.

Joshua Register, Wm. Geo. Webb, J. S. Roche, and John McCart (assignees of John Calver) of Baltimore, Md., for an Improved Waste Device for Hydrants. Patented April 22, 1856:

We claim the described arrangement of the plunger relative to the discharge-pipe, and capable of elevation proportioned to the capacity of said pipe, by forming a chamber in the lower portion of the hydrant for the reception of the contents of the discharge-pipe.

Also, in combination, the arrangement of the valve, C, by means for operating it, by the spring, H, substantially as and for the purposes specified.

Jos. W. Bartlett, of New York City, assignee of O. L. Reynolds, of Dover, N. H., for an Improvement in Sewing-machines. Patented May 14, 1850:

I claim, first, The employment and use in a sewing or tambouring machine of a needle or thread-carrier, having a movable or flexible beard or hook, and also the combination with the said needle or thread carrier of a mechanism for closing the beard thereof.

Second, The combination with a beared instrument used as before described of the thread-guide, V, having the motions described, such as shall carry the thread across the path of the bearded instrument and present it to the action thereof, without carrying the thread around the shank of the said bearded instrument, in the manner set forth and described.

Third, The combination of the cam, G, lever, O, and guide, V, with a spring, whereby the thread is presented to the action of the bearded instrument, as set forth.

Samuel Morrill, of Andover, N. H., for an Improvement in Clothes' Dryers. Patented Nov. 14, 1856:

I claim, first, Tilting the reel to the desired position to enable a person to place the clothes on the lines without high reaching, and elevate them in good position to dry, and out of the way of injury, substantially as set forth.

Second, Arranging and combining with a rotary tilting reel the ratchet, G, and a pawl, H, or their equivalents, for preventing backward rotary motion of the reel as the clothes are placed on the lines, and moved along substantially as set forth.

Third, Operating the reel by the combined action of the arm, C, jointed arm or lever, E, and loop or staple, F, or its equivalent, substantially as set forth for the purpose specified.

Ephraim Ball, of Canton, Ohio, assignor to Ball & Butler, and Ball & Butler assignors to Ephraim Ball aforesaid, for an Improvement in Mowing-machines. Patented Dec. 1, 1857:

I claim first, The combination of the short curved arm, R, with the bar, Q, and finger-bar, P, the whole constructed and arranged for joint operation, substantially as and for the purposes above set forth.

Second, I claim the combination of the coupling arm, with bar, Q, wrist, f, socket, h, hinge, g, and short finger-beam, P, substantially as and for the purposes set forth.

Third, I claim extending the coupling arm, R, outside of the frame in combination with the front hinges of bar, Q, also outside of the main frame, when the parts are constructed and arranged in the manner substantially as described, whereby greater freedom of the movement of the cutting apparatus is secured.

Ephraim Ball, of Canton, Ohio, assignor to Ball & Butler, and Ball & Butler assignors to Ephraim Ball aforesaid, for an Improvement in Mowing-machines. Patented Dec. 1, 1857:

I claim the combination of the independent driving wheel, B, at the grain side of the machine, with the hinged bar, Q, to which the short finger-beam is rigidly attached, and the hinged coupling arm, whereby the cutting apparatus may rise and fall freely, and the cutters be kept in operation while turning to the left upon uneven ground, substantially as described.

DESIGNS.

S. B. Ellithorp, of New York City, for a Design for the Frame of a Sewing-machine.

B. M. Johnson, of New York City, for a Design for Gas Cocks, &c.

## Notes and Queries

A. T. L., of Ga.—Your galvanic battery is similar to what is called the "Maynooth battery." You have simply substituted iron for the negative plate, in place of copper, platina or charcoal.

R. D. & Co., of C. W.—The condensers of coal-oil vapors used here are simply close tanks of boiler-iron, which we suppose you can have made at Toronto.

H. B. M., of Conn.—The best substance which we can recommend to put on your smoke stack, to prevent it burning off, is black-lead mixed with alum water (some alum dissolved in warm water). It will not burn off so rapidly as the coal-tar which you have tried.

J. McR., of Ga.—It will require a very large hydraulic ram to force water half a mile to an elevation of 30 feet, with a fall of 5 feet. If the supply of water is abundant you can do it, but the cost for lead pipe and apparatus will be great.

H. S. S., of Pa.—The best way to prepare a black board is to give it one or two coats of black paint as a groundwork, then put on one coat of copal varnish and allow it to dry, after which it should be slightly rubbed down with fine sand paper. After this give it another coat of the same kind of varnish, in which some very fine emery or ground glass is mixed, which will permit the board to be used either with chalk or a common slate pencil.

R. K., of Texas.—We cannot forward you any single number containing a description of the hydraulic ram. In Vol. V. of the SCIENTIFIC AMERICAN this hydraulic motor is illustrated and described. If well constructed, it is perfectly reliable; and on a fall of 5 feet, it will raise about one-twelfth of the inlet water 50 feet high through 1,000 feet of lead pipe.

W. H., of Ill.—The evaporation of a cubic foot of water per hour is considered to be the horse-power of a boiler; but by using steam expansively, the horse-power of an engine does not require this amount of water evaporated. About 12 pounds of water have been evaporated with one pound of coal.

W. B., of Pa.—We are in favor of employing insulators on houses for fastening lightning-rods. Iron staples, being conductors, are not so suitable for staying the rods as non-conductors; they are safe, however, if driven into dry wood or some other good non-conductor, but not otherwise.

ANTI-STRIKE.—We prefer not to publish any communications upon the subject of strikes. The facts stated in your case are no doubt correct.

S. A., of Pa.—Your suggestions in regard to steam-engines are not founded upon a correct knowledge of what Watt and others have done. If you procure Bourne's "Catechism of the Steam-engine" you will get some ideas on this subject with which you are not familiar.

J. P. H., of Va.—You state that the feed-water for your boiler comes through coal seams, and that it corrodes the metal at the water level of the boiler in such a manner that it requires to be patched about once every year. In all likelihood the feed-water contains sulphur (taken up from the iron pyrites in the coal), which is converted into dilute sulphuric or sulphurous acid in the boiler, and thus corrodes the iron rapidly. The remedy for you is to change your feed-water by collecting rain in a pond, if you cannot get suitable water from a well.

R. H. L., of Minn.—By combining bismuth, in and lead in various proportions, alloys are formed of various degrees of fusibility above and below the temperature of boiling water. Eight parts of bismuth, five of lead and three of tin form an alloy which melts in boiling water. This was discovered by Sir Isaac Newton.

G. E. R., of Ohio.—Sulphurous acid is a gas taking on the liquid form only at a temperature of zero or below. Water, however, absorbs some 40 times its bulk of this gas, and the solution is sometimes called liquid sulphurous acid. It retains the solution its bleaching properties. A solution of the sulphite of soda forms a similar bleaching liquid. Sulphurous acid does not produce a permanent white as chlorine does.

L. E., of N. Y.—The best way to lay a pipe of varying diameter for carrying water from an elevation is to place the end of greatest diameter at the spring and the narrow end of the outlet near your house.

H. S., of Conn.—You will find a letter to your initials in the post-office, upon the subject of coal-oil.

J. W, of N. Y.—The glass water-gage on the outside of a steam boiler secures the object you desire to attain by a long metal tube inside, connected with the gage-cocks. We consider the glass gage reliable in indicating the hight of water.

G. K., of Conn.—Boilers are placed in a horizontal position in steamships and down in the lower deck or floor. We have seen a vertical boiler used on a steamboat, but the horizontal tubular are in general use, and are the best for such purposes.

M. V. C., of Ala.—There is no possible way of detecting poison in spirituous liquors but by analysis.

W. L. B., of Mass.—When air is compressed its latent heat becomes sensible; but in grinding tools, this action, we think, will not account for the sensation experienced in grinding by the correspondent to which you refer.

D. N. & Co., of Md.—The cement for mending broken china-ware and glass is made by stirring finely powdered quicklime among the white of eggs.

W. L., of C. W.—We think the place you name is healthy, but before deciding to remove there, you had better make it a visit and learn from observation all about it.

E. F., of Wis.—We do not know where you can procure the "Tinner's Guide."

R. H., of Mass.—You should stamp the date of your copyright upon each article sold. This will be a warning to all who undertake to infringe your right.

J. A., of Wis.—If the person you refer to has had the the cement you described in use for 22 years, of course it is now public property, as he did not take proper measures to secure a patent.

P. Rr, of Mo.—Iron is the proper metal for a pump to pump mercury with. The india-rubber manufacturers say that rubber-packing would be serviceable and unobjectionable for packing such a pump.

S. F. S., of Wis.—Exhibitions of the magic lantern and microscope have been tried, but perhaps with insufficient effort and enterprise. Microscopes are exhibited daily in fine weather in the Park, New York. There is no more interesting study than the wonders of the invisible world, and it is attracting a great deal of attention. Lardner, on the microscope, is a good book to begin with.

G. C. J., of N. Y.—Engravings are transferred to wood by the photographic process; to glass, by cutting out the engraving and pasting it on the inside of the glass vessel, and then painting the whole inside of the vessel. This is the potichomanie which was so fashionable a few years since.

J. P., of Cal.—We can send you the bound volumes of the SCIENTIFIC AMERICAN by Wells, Fargo & Co.'s express. The price will be—For subscription, $2; binding two volumes in one, $1; total, $3; you to pay the express charge.

S. M. B., of Mass.—Your patent is for a door hinge, and you claim the roller between two inclined planes in the manner and for the purpose described. By the terms of your patent your invention applies to hinges only, so that the use of analogous parts in the formation of a screw press, or other machines, would not be an infringement of your patent.

W. T. T., of N. Y.—Asks the following question: "If I patent a machine and dispose of the right, and then make an improvement which I also patent, does that improvement belong to me or to the purchaser of the original right? and can said purchaser use said improvement without my consent?" We answer: Unless there is a previous agreement by which the patentee stipulates to convey all subsequent improvements made by him, he would have entire control of the patent for the improvement, and no one could use it without his consent.

G. C. T., of Pa.—All marble, chalk, and nearly all shells, are limestone. It is composed of carbonic acid and lime. There is no distinctive marks by which you can distinguish limestone suitable for hydraulic cement; the only way is to burn a quantity and try it. This variety contains various foreign substances, the essential one being silex. To make 12 gallons of black ink take 12 lbs. of nutgalls, 5 lbs. of green sulphate of iron, 5 lbs. of gum senegal and 12 gallons of water. Put the bruised nutgalls into a copper kettle of a depth equal to its diameter, and boil during three hours with three-fourths of the above quantity of water, taking care to add fresh water to replace what is lost by evaporation. The decoction is to be emptied into a tub, allowed to settle, and the clear liquor being drawn off, the lees are to be drained. The skins which thicken on the top of open vessels of paint (called paint-skins) are the best application to prevent a shingle roof from leaking at the seam where it joins a neighboring building.

P. H. W., of N. Y.—The "New York Belting and Packing Company," No. 38 Park-row, inform us that they do not recommend rubber for packing the pistons of pumps; but for packing the piston-rods and valves they consider it better than leather. The amount of pressure required to raise water in a tube is 15 lbs. to the inch for every 34 feet, which would give 102½ lbs. for 230 feet. In order to ascertain the pressure required to throw a jet to this hight in the open air, many circumstances would require to be taken into account—the length, size and material of the hose, the shape and size of the pipe, the shape of the nozzle, &c. In the case you mention, the pressure was probably not less than 150 lbs. to the inch.

## Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Oct. 1, 1859:—

A. E., of Mich., $30; J. G., of Ky., $35; J. H. S., of Canada, $30; C. H. D., of Wis., $30; J. W., of Ohio, $30; H. C. F., of Pa., $55; W. H. L., of N. Y., $25; R. & S., of Ohio, $30; D. W. C., of Ill., $30; W. & C., of Ind., $25; A. & D., of Ala., $25; G. J. P., of Mass., $25; W. C. C., of N. Y., $30; J. C. L., of Conn., $12; S. B., of Wis., $25; J. E., of N. Y., $30; T. C. McK., of Tenn., $35; J. J. M., of Fla., $35; S. S., of N. Y., $30; S. F. L., of Conn., $25; N. & B., of Tenn., $25; B. B., of Md., $30; W. J. J., of Ala., $35; T. W., of Conn., $25; O. E. W., of Mass., $30; W. H. H., of Cal., $35; N. S., of Mass., $30; D. W., of Mass., $30; S. P., of Mass., $25; J. C. R., of N. Y., $30; E. K., of Conn., $25; C. L. G., of N. Y., $30; C. C. B., of Ohio, $30; G. M. A., of Ill., $30; F. F. B., of Iowa, $30; D. P., of N. Y., $12; G. C., of Maine, $30; R. C. C., of Ga., $35; W. E., of Maine, $35; C. & C., of Pa., $30; L. A. B., of N. Y., $35; F. & S., of N. Y., $250; H. B., Jr., of Pa., $35; J. T. R., of Pa., $15; J. E. S., of Maine, $35; E. T. W., of N. H., $30; C. W. R., of Ga., $30; W. T., of Mass., $30; B. F. D., of Pa., $30; W. E., of Texas, $30; W. P. C., of Ind., $35; J. Y. S., of Pa., $35; T. M., of N. Y., $25; M. F., of Ind., $30; G. W. B., of Ala., $30; G. F. P., of N. H., $25; P. L., of N. Y., $30; T. C. H., of Ga., $25; J. S. D., of N. J., $100; H. B., of Ill., $15.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Oct. 1, 1859:—

H. & B. of England; H. & F. of Pa.; J. G. K. of N. Y.; J. C. L. of Conn.; D. P., of N. Y.; T. C. McK. of Tenn.; H. C. R. of Mass.; W. H. L. of N. Y.; G. J. P. of Mass.; A. & D. of Ga.; N. G. S. of N. Y.; T. R. of Conn.; W. & C. of Ind.; S. P. of Mass.; S. F. L. of Cal.; W. E. of Maine; R. C. C. of Ga.; G. C. of Maine; C. & C. of Pa.; S. B. of Wis.; D. M. C. of N. H.; H. B. F. of N. Y.; L. A. B. of N. Y.; J. L. of R. I.; N. & B. of Tenn.; H. B., Jr., of Pa.; G. S. A., of N. Y.; S. & H. of N. Y.; J. B. A. of N. Y.

## Literary Notices.

LIFE AND TRAVELS OF HUMBOLDT.—Rudd & Carleton, publishers, No. 130 Grand-street, New York.—This is a neat volume and a very good compilation, and contains much in little space regarding the great philosopher and traveler. It describes his education, manhood and whole life in a brief and interesting manner. It is a most attractive book, and contains much that is fascinating to the admirers of the curious and learned.

DICTIONARY OF LOVE.—Dick & Fitzgerald, No. 18 Ann-street. Price $1.—A book interesting to love-sick swains, to which class only do we recommend it.

BLACKWOOD'S MAGAZINE.—Leonard Scott & Co., No. 54 Gold-street.—The number for this month is as attractive as usual. This magazine stands in the front rank of literature. One article on voluntary and involuntary actions, contains much that is very curious about the "machine of machines"—the human body.

THE TELEGRAPH MANUAL.—This is a noble volume, devoted to the history and practice of telegraphing, by Tal. P. Shaffner, Esq., and published by Pudney & Russell, John-street, New York. It is illustrated with a great number of wood-cuts, representing nearly all the telegraphs which have been invented; and it has also quite a number of steel plates, portraits of those who have been distinguished in American telegraphy, such as Morse, Kendall, Swain, &c. It is the best, most comprehensive and most handsome work on the subject which has yet been given to the public, and it appears to be edited with much ability and candor.

## History of the Scientific American and Important Information to Patentees.

We have printed a supplementary edition of the SCIENTIFIC AMERICAN, in which there is a history of its rise and progress, with illustrations of the building, externally and internally, showing the spacious rooms in which our immense patent business is conducted, and with life-like representations of the artists, engineers and specification writers at their daily labors. The same paper contains information on the many intricate points arising in patent law and practice, and comprises the best popular treatise on the subject ever published; it should be in the hands of all who are interested either in procuring, managing or using patented inventions. The legal information contained in this paper is the result of FOURTEEN YEARS' experience as patent solicitors, and it cannot be found in any other treatise on patent law. It also contains information in regard to Foreign Patents and Extensions. It is published in octavo form, sixteen pages, and mailed upon receipt of two three-cent stamps. Address MUNN & Co., publishers of the SCIENTIFIC AMERICAN, New York City.

BACK NUMBERS.—We shall hereafter commence sending the SCIENTIFIC AMERICAN to new subscribers from the time their subscriptions are received, unless otherwise directed; the back numbers can be supplied from the commencement of the volume to those who may order them. It is presumed most persons will desire the back numbers, and such as do will please to so state at the time of sending in their subscriptions; they can, however be supplied at any subsequent period.

INFALLIBLE RULE—It is an established rule of this office to stop sending the paper when the time for which it was prepaid has expired, and the publishers will not deviate from that standing rule in any instance.

INVENTORS SENDING MODELS to our address should always enclose the express receipt, showing that the transit expenses have been prepaid. By observing this rule we are able, in a great majority of cases, to prevent the collection of double charges. Express companies, either through carelessness or design, often neglect to mark their paid packages, and thus, without the receipt to confront them, they mulct their customers at each end of the route. Look out for them.

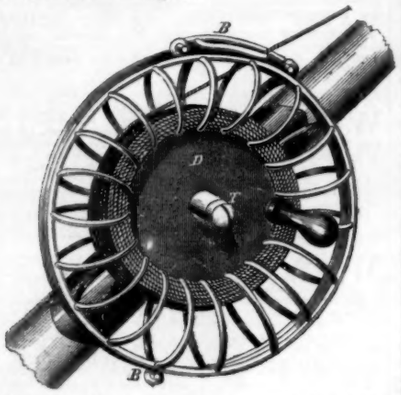
GIVE INTELLIGIBLE DIRECTIONS—We often receive letters with money inclosed, requesting the paper sent for the amount of the enclosure, but no name of State given, and often with the name of the post-office also omitted. Persons should be careful to write their names plainly when they address publishers, and to name the post-office at which they wish to receive their paper, and the State in which the post-office is located.

SUBSCRIBERS to the SCIENTIFIC AMERICAN who fail to get their papers regularly will oblige the publishers by stating their complaints in writing. Those who may have missed certain numbers can have them supplied by addressing a note to the office of publication.

PATENT CLAIMS—Persons desiring the claim of any invention which has been patented within 14 years can obtain a copy by addressing a note to this office, stating the name of the patentee, and date of patent when known, and enclosing $1 as fee for copying.

## FISHING REEL.

With the increase of wealth in the nation, and the growing fashion of visiting the country every summer, more and more money is paid every year for hunting and fishing apparatus. Our summer wanderers who love to drop their artificial fly on to the surface of the deep still pool, where the spangled trout is lying in his cool recess, or who can play and weary down a 12-pound salmon with a delicate pole and line which would hardly raise a two-pound pickerel at a dead lift, will appreciate any improvement in the fishing reel.




The annexed cut represents a new reel, the principal object of which is to wind the line in a ring, so that it will dry more readily. In the center of the disk, D, the hollow thimble, T, is soldered. This thimble fits upon a pin projecting from a plate which is fastened to the pole in the usual manner. On to the periphery of the disk, D, the series of divided rings are made fast, forming a skeleton tube with a slit running around the middle of the outside of it. This slit is partly closed by a smooth ring which passes nearly around the reel, and is prevented from revolving with the reel by the braces, B B, which hold it firmly. Through a loop in one of these braces the line enters the reel, and thus comes upon the coil nearly or quite in the direction of the tangent.

The inventor claims that, besides the advantage of drying the line more readily, this reel is more portable than the old one, being nearly in the form of a flat disk, and fitting snugly into the pocket; that it is lighter and cheaper; and that the line can be wound more rapidly.

The patent for this invention was granted (August 9th, 1859) to William Rillinghurst of Rochester, N. Y.

## THE REAL MOTION OF THE SUN.

One of the last triumphs of Astronomy is the discovery of the translatory motion of the Solar System. If we are walking from one grove of trees to another, the trees which we are approaching will seem gradually to spread farther apart, or subtend larger angles to the eye, while those which we are leaving will seem to draw more closely together, or subtend smaller angles to the eye. By numerous and very delicate observations of the stars, it is found that those in the constellation "Hercules" appear to recede from each other, while those in the exactly opposite portion of the heavens appear to be drawing more closely together. From these changes in the apparent position of the stars, the inference is irresistible that we and, of course, the Sun and all the Solar System, are sweeping through space in the direction of the constellation "Hercules." The exact point in the heavens towards which we are moving has been calculated from observations of 797 stars, to be 259° 9′, Right Ascension, 34° 36′, North Declination, but it is understood that this is liable to prove slightly erroneous on further observation. The great problem on which astronomers are now engaged is to ascertain whether this motion is in a straight line, or whether the Sun is revolving in a great orbit about some immensely distant center. Already, observations seem to indicate that the motion is in a curve, and that the center will be found in the vicinity of the "Pleiades." The velocity of this motion, and the inconceivable length of time in which a single revolution will be accomplished, have not yet been ascertained, and they will no doubt be subjects of investigation for future generations. Sufficient, however, is already known to justify the assertion that the whole past history of the human race fills but an inconsiderable fraction of this long year.

## CARL'S IMPROVED GRINDING-MILL.

How various have been the devices for breaking wheat! The savage pounds it in a hole in the rock; among the Hebrews, two women turned the mill, and the blind Samson did grind for the Philistines. In this busy century, innumerable ingenious devices have been made for improving this most necessary of all arts. The annexed engraving represents one for which a patent was granted to J. Carl, of Grenada, Miss., on the 23d of August, 1859.

Fig. 1 is a vertical, transverse section of the whole mill, and Fig. 2 is a horizontal view of the upper stone. A, is a frame of wood, and, B, a vertical shaft which is stepped into the bottom cross bar. *a*. The upper stone, C, is attached to the shaft, B, by means of a hinged lever, *a*, which is secured to the shaft by means of a pivot, *b*, the stone being provided with a recess, *c*, which extends nearly or quite up to its middle, and is sufficiently large to receive the ends of the lever. The lever, *a*, is fastened to the stone, C, by means of the screw bolts, *d d*, and the stone is balanced on the pivot, *b*, which secures the lever, *a*, to the shaft. The lower stone, D, is attached to a tube or sleeve, E, which fits nicely on the shaft, B, of the upper stone and which rests on the bridge-tree, E. One end of the bridge-tree is pivoted to

Fig. 1

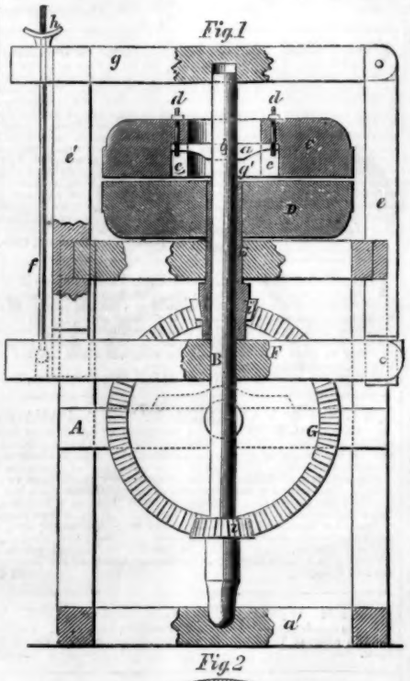
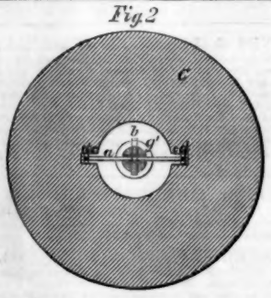



Fig. 2




the lower end of the standard, *e*, and its other end is suspended on the rod, *f*, which passes to the outer end of the bar, *g*, and is provided with a screw and nut, *h*, for raising and lowering the bridge-tree, F. One end of the top bar, *g*, is hinged to the upper end of the standard, *e*, and its other end rests on a corresponding standard, *e′* the lower end of which forms a guide to the bridge-tree, E. The shaft, B, passes freely through the bridge-tree and its upper end is guided in a cavity in the top bar, *g*, a collar or ring, *g*, being slipped over this shaft so as to prevent the dust and flour from getting between the same and the tube, E. Motion is conveyed to the two stones by means of a large bevel wheel, *s*, which gears in two pinions, *i*, and *i′*; the pinion, *i*, being firmly secured to the lower end of the shaft, B, and the pinion, *i′*, to the lower end of the tube, or sleeve, E. As these two pinions gear into the opposite sides of the wheel, G, the stones, C and D, are rotated in opposite directions.

The object of securing the upper stone, C, to the shaft, B, by means of the hinged lever, *a*, is three-fold. In the first place the upper bearing of the shaft is thereby brought into such a position that it can be easily oiled, while it is more perfectly sheltered from the dust and flour. Secondly, by attaching the same to the lever which is pivoted to the shaft, its grinding surface can always adapt itself to the surface of the lower stone; and, thirdly, when the lower stone is raised by the action of the rod, *f*, and nut, *h*, a direct pressure is exerted on the substance between the grinding surfaces of the two stones independently of the weight of the upper stone, as the said stone is secured to the shaft, B, in such a manner that it cannot slide along said shaft. From this description it will be seen that the stones can be adjusted to grind either coarse or fine, by turning the nut, *h*.

Any further information can be obtained by addressing the inventor as above.

WALKING UNDER WATER.—A diver in a suit of submarine armor, recently crossed the Schuylkill river, near Philadelphia, marching on its bottom with ease and safety. His suit consisted of an india-rubber dress which covered him up to the neck, and over this was a sheet-copper hood covering the head as a helmet, and extending down to the shoulders. A pipe to supply fresh air was connected with the helmet, and two men in a boat followed him pumping in the necessary quantity; the foul air escaped by a valve. A rope was suspended under the water, from one shore to the other, as a guide to the diver, who reached the western side in 25 minutes from the time of entering the water. The trip back was made in 20 minutes. His progress through the water was indicated by a slight bubbling and rippling as he passed along.

SMELL INJURED BY SNUFF.—The sensibility of the nerve of smelling is blunted and perverted by all, irritating odors and substances. Hence those who would preserve all the senses which God has given them should avoid snuff, smelling-salts, &c. A good smell is necessary to a good taste, as is manifest to those who have been troubled much with cold in the head.